Test Report

Date : 2020-04-07
No. : HP20030347

Applicant:	BANDAI (SHENZHEN) CO., LTD. 13/F., Dingfeng Building, No. 1036, Baoan Nan Rd., Luohu District, Shenzhen, China
Manufacturer:	Idea Kids Mao Wan Industrial District, San Xiang Town, Zhong Shan City, Guangdong, China
Description of Sample(s):	Product: Complete selection modification (PB) CSM TATSUROTTO Brand Name: BANDAI Model Number: 2516002 FCC ID: PQ32516002
Date Sample(s) Received:	2020-03-20
Date Tested:	2020-03-30 to 2020-04-02
Investigation Requested:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2018 and ANSI C63.10:2013 for FCC Certification.
Conclusion(s):	The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.
Remark(s):	---

LEUNG Kwun Hang, Joey
Authorized Signatory

Test Report

CONTENT:

Test Report

1.0 General Details

1.1 Equipment Under Test [EUT]
Description of Sample(s)

Product:	Complete selection modification (PB) CSM TATSUROTTO
Manufacturer:	Idea Kids
Brand Name:	BANDAI
Model Number:	2516002
Rating:	AAA x 2 = 3.0Vd.c

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is 2.4GHz RF Transmitter Toy, which is 2.4GHz transceiver fixed transmit at 2477MHz, modulation is GFSK type which is provided by IC.

1.3 Date of Order

2020-03-20

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2020-03-30 to 2020-04-02

1.6 Country of Origin

China

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 Regulations and ANSI C63.10:2013 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION
Results Summary

Test Condition	Test Requirement	Test Method	Class / Severity	Test Result	
				Pass	Fail
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	ANSI C63.10:2013	N/A	☒	☐
AC power-line conducted emissions	FCC 47CFR 15.207	ANSI C63.10:2013	N/A	N/A	
20 dB Bandwidth	FCC 47CFR 15.215	ANSI C63.10:2013	N/A	☒	☐
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	☒	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	☒	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Field Strength of Fundamental & Harmonics Emissions

Test Requirement:	FCC 47CFR 15.249
Test Method:	ANSI C63.10:2013
Test Date:	2020-02-26
Mode of Operation:	Tx Test mode

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. In the frequency range of 9kHz to 30MHz, The center of the loop antenna shall be 1 meter above the ground and rotated loop axis for maximum reading. The emissions worst-case are shown in Test Results of the following pages.

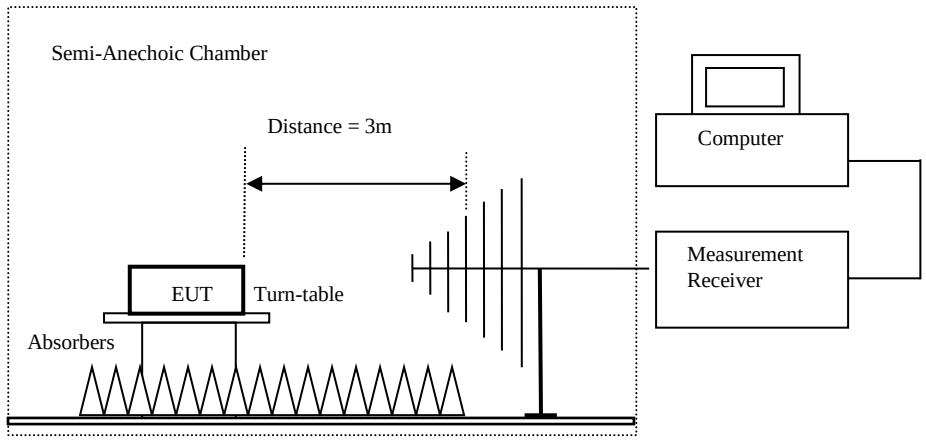
Remark: 3 orthogonal axis apply to hand-held device only.

*: Semi-anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd.
FCC Test Firm Registration Number 723883
Designation Number HK0001

Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)	RBW:	10kHz
	VBW:	30kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
30MHz – 1GHz (QP)	RBW:	120kHz
	VBW:	120kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
Above 1GHz (Pk & Av)	RBW:	1MHz
	VBW:	1MHz or ≥ RBW
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold

Test Setup:



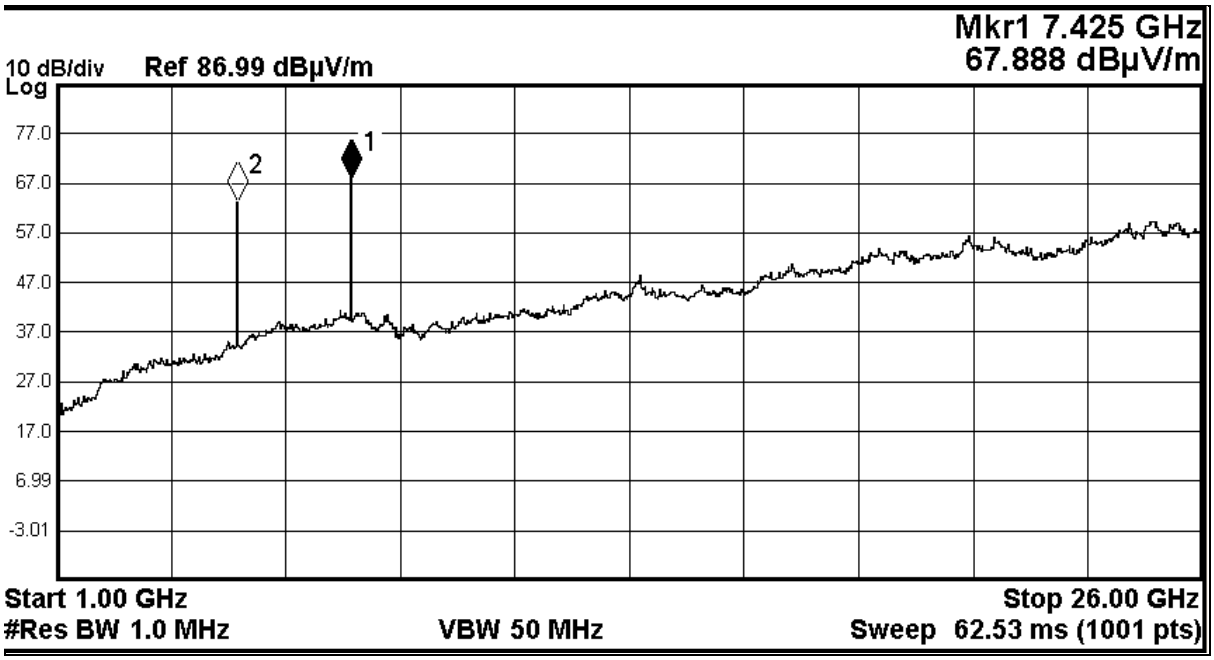
Ground Plane

- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used,
9kHz to 30MHz loop antennas are used.
-For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground

Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:

Fundamental frequency [MHz]	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

Result of Tx Mode, (Above 1GHz): Pass



Result of TX mode, (Above 1GHz): Pass

Field Strength of Fundamental and Harmonics Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV/m	Correction Factor dBµV/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
2477.0	55.6	27.9	83.5	14,962.4	500,000	Vertical
* 4950.0	31.2	32.1	63.3	1,462.2	5,000	Vertical
7425.0	29.3	38.6	67.9	2,483.1	5,000	Vertical
9908.0	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 12385.0					5,000	Vertical
14862.0					5,000	Vertical
17339.0					5,000	Vertical
* 19816.0					5,000	Vertical
22293.0					5,000	Vertical
24770.0					5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV/m	Correction Factor dBµV/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
2477.0	8.9	27.9	36.8	69.2	50,000	Vertical
* 4950.0	2.3	32.1	34.4	52.5	500	Vertical
7425.0	0.9	38.6	39.5	94.4	500	Vertical
9908.0	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 12385.0					500	Vertical
14862.0					500	Vertical
17339.0					500	Vertical
* 19816.0					500	Vertical
22293.0					500	Vertical
24770.0					500	Vertical

Remarks: The fundamental frequency was not included in the pre-scan plot, a 2.4G notch filter was added prior to the Receiver, please refer the band-edge plot for the level of fundamental frequency.

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

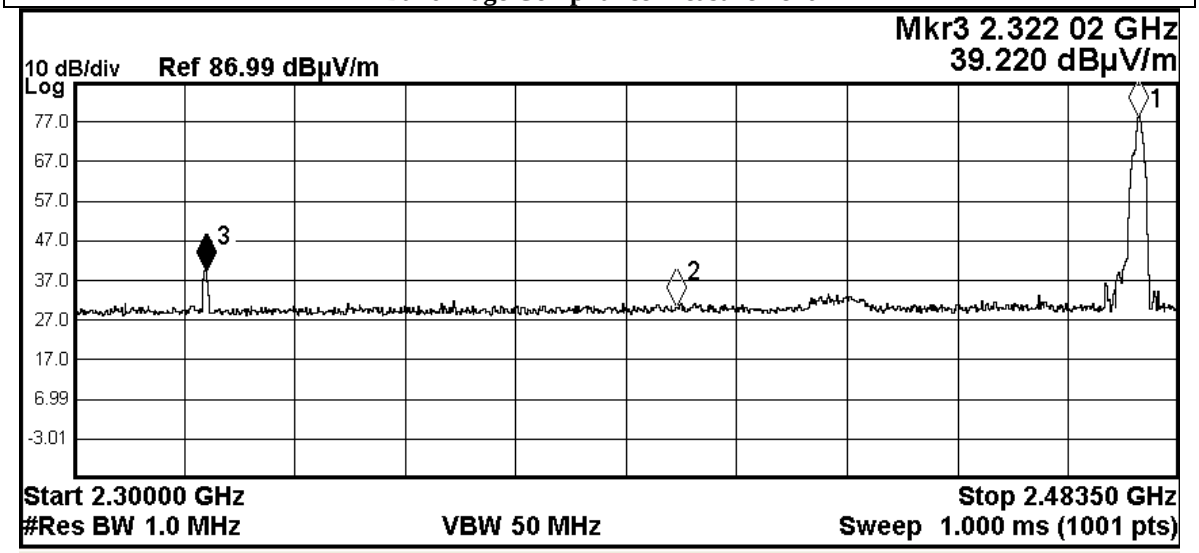
***: Denotes restricted band of operation.**
Measurements were made using a peak detector. Any emission less than 1000 MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Calculated measurement uncertainty : **9kHz to 30MHz: 2.4dB**
30MHz to 18GHz: 5.0dB
18GHz – 26.5Hz: 5.24dB

Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400MHz – Lowest Fundamental	47.9

Band Edge Compliance Measurement

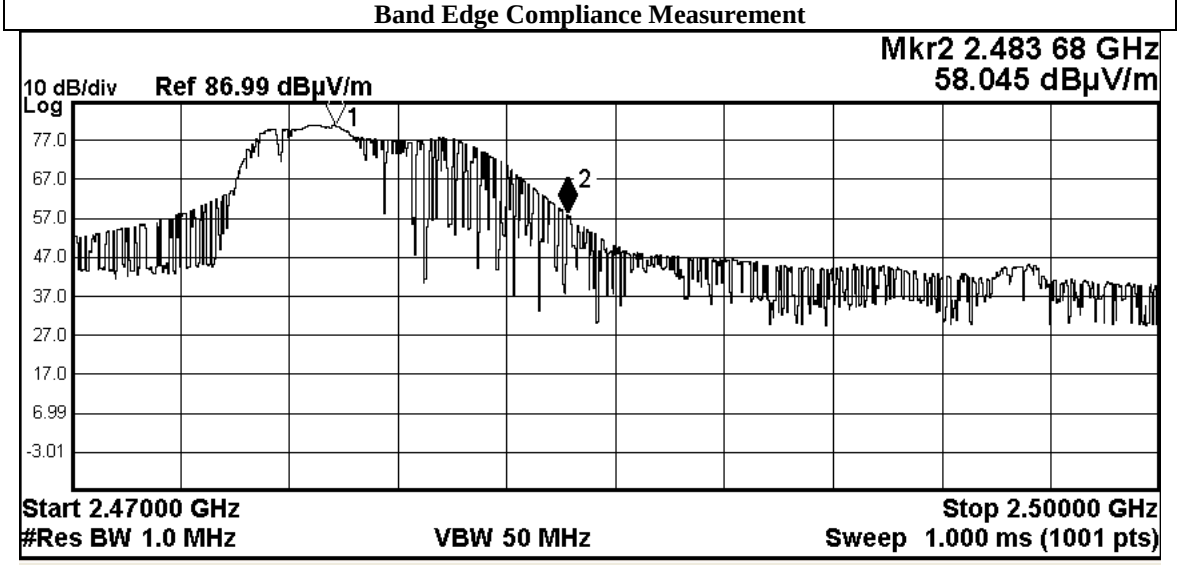


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.476 71 GHz	78.205 dBµV/m			
2	N	1	f	2.400 00 GHz	30.295 dBµV/m			
3	N	1	f	2.322 02 GHz	39.220 dBµV/m			
4								
5								

Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental – 2483.5MHz	22.9

Band Edge Compliance Measurement



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.477 29 GHz	80.983 dBµV/m			
2	N	1	f	2.483 68 GHz	58.045 dBµV/m			
3								
4								

Result of TX Test mode, Band-edge measurement: PASS

Field Strength of Fundamental and Harmonics Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV/m	Correction Factor dBµV/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
2322.0	11.3	27.9	39.2	91.2	5,000	Vertical
2483.7	30.1	27.9	58.0	794.3	5,000	Vertical

Field Strength of Fundamental and Harmonics Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV/m	Correction Factor dBµV/m	Field Strength dBµV/m	Field Strength µV/m	Limit @3m µV/m	E-Field Polarity
2322.0	1.1	27.9	29.0	28.2	500	Vertical
2483.7	7.9	27.9	35.8	61.7	500	Vertical

Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

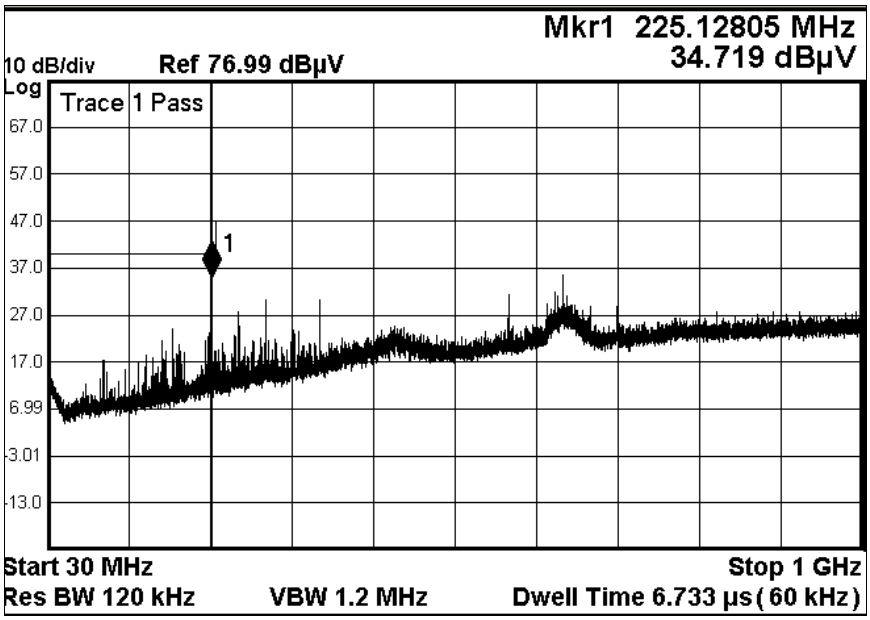
Remarks: Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate in the table below is the worst case rate with respect to the specific test item.
Investigation has been done on all the possible configurations for searching the worst cases.

The pre-scan results are for reference, the frequencies found will perform final measurement which shown on the table below the graphs, therefore, there may be some different in measured frequencies and field strength shown on the graph and the table.

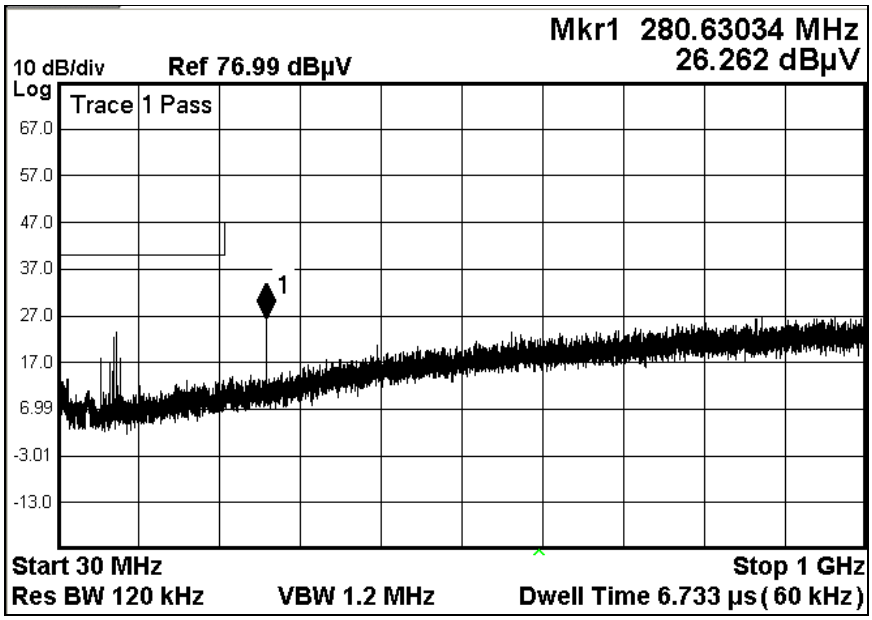
Result of TX mode, (9kHz – 30MHz): PASS
Emissions detected are more than 20 dB below the FCC Limits

Result of TX mode (30MHz – 1GHz): PASS

Horizontal



Vertical



Result of TX mode (30MHz – 1GHz): PASS

Field Strength of Fundamental and Harmonics Emissions Quasi-Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
100.0	17.5	8.3	25.8	19.5	150	Vertical
225.1	22.9	8.8	31.7	38.5	200	Horizontal
280.6	15.3	13.2	28.5	26.6	200	Vertical
321.7	13.4	14.4	27.8	24.5	200	Horizontal
567.3	7.3	22.6	29.9	31.3	200	Horizontal
643.1	8.4	23.1	31.5	37.6	200	Horizontal

Result of Receiver mode, (9kHz – 30MHz):
Emissions detected are more than 20 dB below the FCC Limits

Result of Receiver mode, (30MHz – 1GHz):
Refer to Page 13 - Result of TX mode

Result of Receiver mode, (1GHz – 18GHz):
Emissions detected are more than 20 dB below the FCC Limits

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz
Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty	:	(9kHz – 30MHz):	2.4dB
		(30MHz – 18GHz):	5.0dB
		(18GHz - 26GHz):	5.24dB

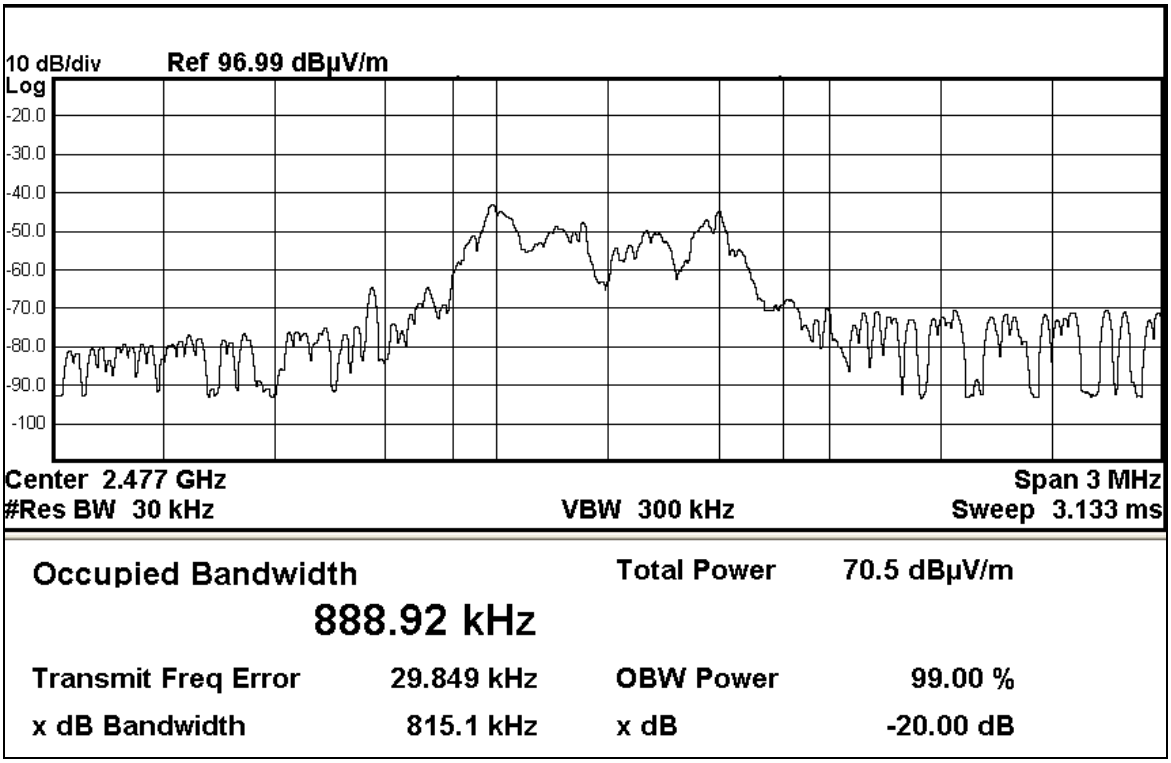
3.1.2 20 dB Bandwidth [FCC 47 CFR 15.215]

Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2477.0	0.82

Tx Mode

20dB Bandwidth of Fundamental Emission



3.1.3 Antenna Requirement

Ambient temperature 21°C Relative humidity 50%

Test Requirements: § 15.203

Test Specification:

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 shall be considered sufficient to comply with the provisions of this section. 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.

Test Results:

This is wire antenna. There is no external antenna, the antenna gain =0dBi. User is unable to remove or changed the Antenna.

Appendix A

LIST OF MEASUREMENT EQUIPMENT

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2019/04/24	2020/04/24
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A
EM355	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00201783	2019/03/11	2021/03/11
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2019/06/11	2020/06/11
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2018/04/27	2020/04/27
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2018/05/13	2020/05/13
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2018/04/30	2020/04/30

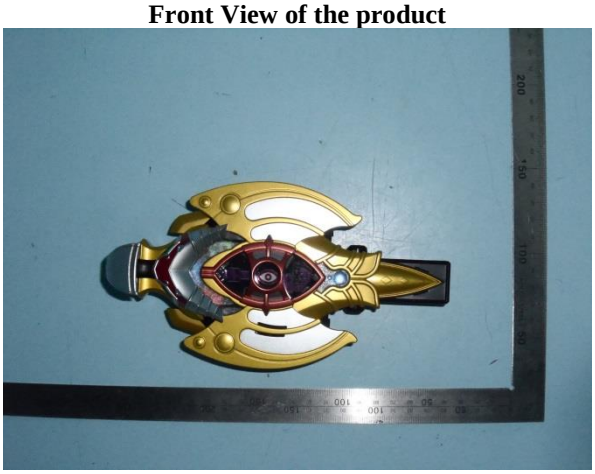
Remarks:

CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

Appendix B

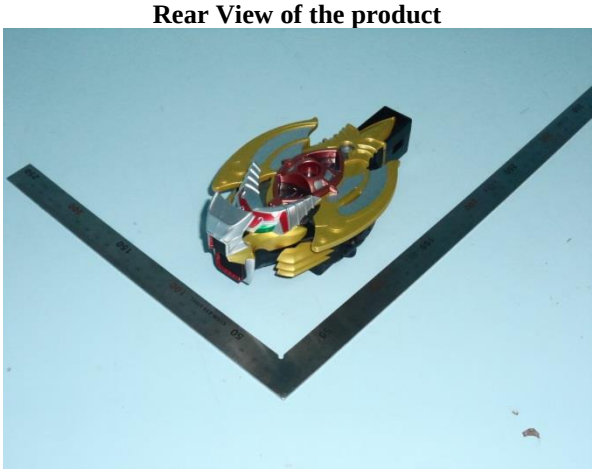
Photographs of EUT

Front View of the product



Rear View of the product

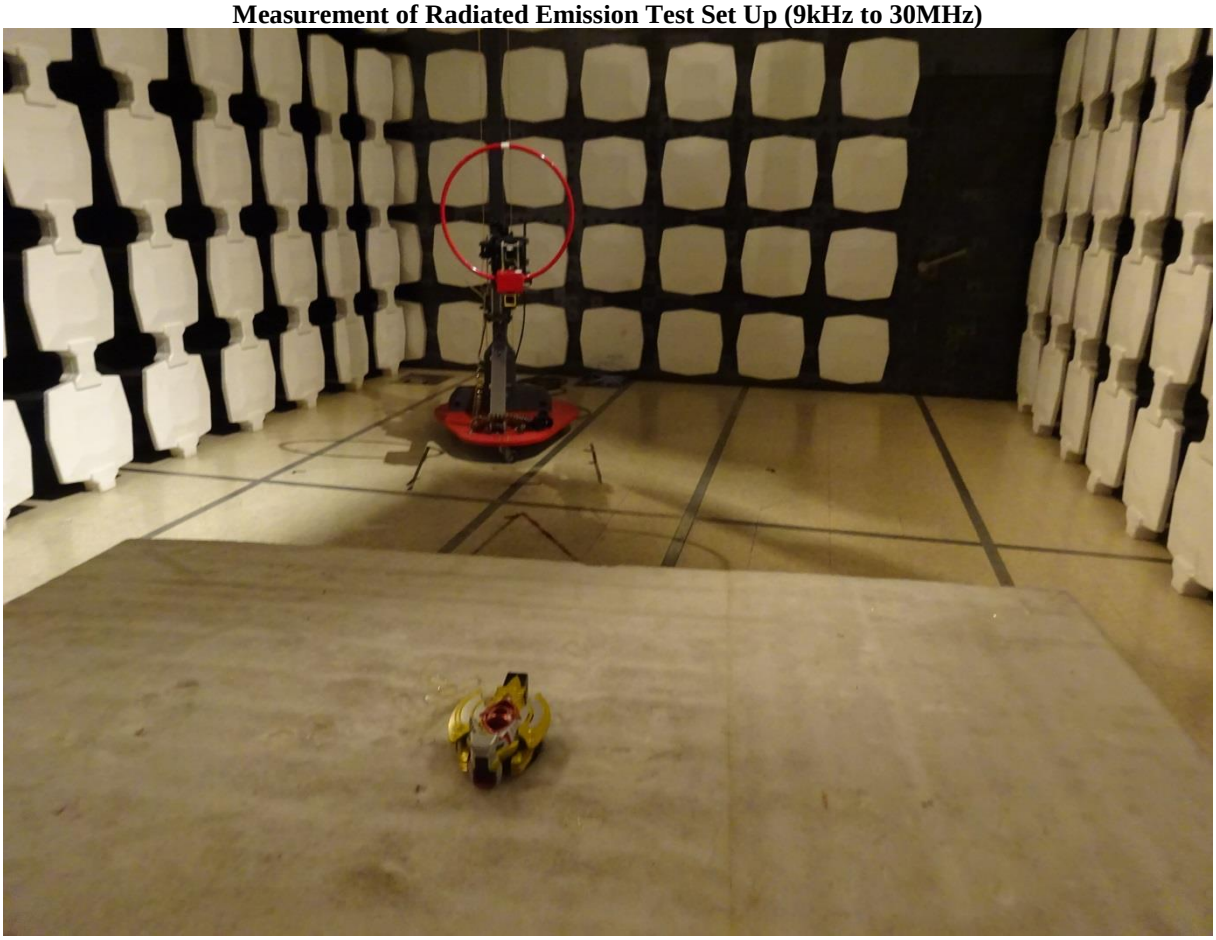
Rear View of the product



Rear View of the product

Photographs of EUT

Measurement of Radiated Emission Test Set Up (9kHz to 30MHz)



Photographs of EUT

Measurement of Radiated Emission Test Set Up (30MHz to 1000MHz)

Photographs of EUT

Measurement of Radiated Emission Test Set Up (Above 1000MHz)

******* End of Test Report *******

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4. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

5. The results in Report apply only to the sample as received and do not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.

6. When a statement of conformity to a specification or standard is provided, the ILAC-G8 Guidance document (and/or IEC Guide 115 in the electrotechnical sector) will be adopted as a decision rule for the determination of conformity unless it is inherent in the requested specification or standard, or otherwise specified in the Report.

7. In the event of the improper use the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

8. Sample submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

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10. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

11. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

12. Issuance records of the Report are available on the internet at www.stc.group. Further enquiry of validity or verification of the Reports should be addressed to the Company.