EMC TEST REPORT for Intentional Radiator

No. 141200755SHA-001

Applicant	:	The Kyjen Company 15514 East Hinsdale Circle,Unit A Centennial,CO 80112
Manufacturer	:	Jiangsu KSBL TECH CO.,LTD NO,19Tianquan RD.,QILIN IND.,PARK,Jiangning District,Nanjing City Jiangsu Province,CN
Product Name	:	MOVE N SHAKE HEDGEHOG&FROG
Type/Model	:	3093/3094

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2013): Radio Frequency Devices

ANSIC63.4 (2003): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Date of issue: Dec 15, 2014

Prepared by: Reviewed by:

Jesse Xu (*Project Engineer*) Daniel Zhao (*Reviewer*)

Description of Test Facility

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IC Assigned Code: 2042B-1

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Content

1. General Information

1.1 Applicant Information

Applicant:	The Kyjen Company 15514 East Hinsdale Circle,Unit A Centennial,CO 80112
Name of contact:	Joe Brown
Tel: Fax:	303-792-9600 303 718 0848
Manufacturer:	Jiangsu KSBL TECH CO.,LTD NO,19Tianquan RD.,QILIN IND.,PARK,Jiangning District,Nanjing City Jiangsu Province,CN

Sample received date	:	Dec 08, 2014
Date of test	:	Dec 08, 2014 ~Dec 13, 2014

1.2 Identification of the EUT

Equipment:	MOVE N SHAKE HEDGEHOG&FROG
Type/model:	3093/3094
FCC ID:	2ADTA-RFID123

1.3 Technical specification

Operation Frequency Band:	2455 MHz
Modulation:	GFSK
Antenna Designation:	Integral, chip antenna
Gain of Antenna:	2.0dBi max used.
Rating:	Battery DC 2*1.5V
Description of EUT:	Here is two models. They have same construction with different model name. .

1.4 Mode of operation during the test / Test peripherals used

While testing transmitter mode of EUT, internal modulation was applied.
For the EUT can be configured in any axes as the user wants, it was set up in three axis (X, Y, Z) and performed test. The three axes were tested one by one while the test receiver worked as “max hold” continuously and the highest reading among the whole test procedure was recorded.

2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESCS 30	R&S	EC 2107	2014-10-21	2015-10-20
Test Receiver	ESIB 26	R&S	EC 3045	2014-10-20	2015-10-19
A.M.N.	ESH2-Z5	R&S	EC 3119	2014-1-9	2015-1-8
A.M.N.	ENV 216	R&S	EC 3393	2014-8-9	2015-8-8
A.M.N.	ENV 216	R&S	EC 3394	2014-8-9	2015-8-8
A.M.N.	ENV4200	R&S	EC3558	2014-8-9	2015-8-8
Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2013-4-28	2015-4-27
Horn antenna	HF 906	R&S	EC 3049	2013-4-28	2015-4-27
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2014-4-12	2015-4-11
Semi-anechoic chamber	-	Albatross project	EC 3048	2014-5-12	2015-5-11
High Pass Filter	WHKX 1.0/15G-10SS	Wainwright	EC4297-1	2014-1-8	2015-1-7
Power sensor / Power meter	N1911A/N1921A	Agilent	EC4318	2014-04-12	2015-04-11
Loop Antenna	FMZB 1516	SCHWARZBECK	/	2014-11-29	2015-11-28
Temperature Camber	SETH-E	tayasaf	EC4315	2014-4-9	2015-4-9

2.2 Test Standard

47CFR Part 15 (2013)
ANSI C63.4 (2003)

2.3 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Radiated emission	15.249 & 15.205	RSS-210 Issue 8 Annex A2.9 & Clause 2.2	Pass
Assigned bandwidth (20dB bandwidth)	15.215(c)	-	Pass
Occupied bandwidth	-	RSS-Gen Issue 3 Clause 4.6.1	NA
Power line conducted emission	15.207	RSS-Gen Issue 3 Clause 7.2.4	NA
Spurious emission for receiver	15B	RSS-Gen	NA

2.4 Data rate VS power

The data rate of EUT is fixed and cannot by adjusted.

3. Radiated emission

Test result: **PASS**

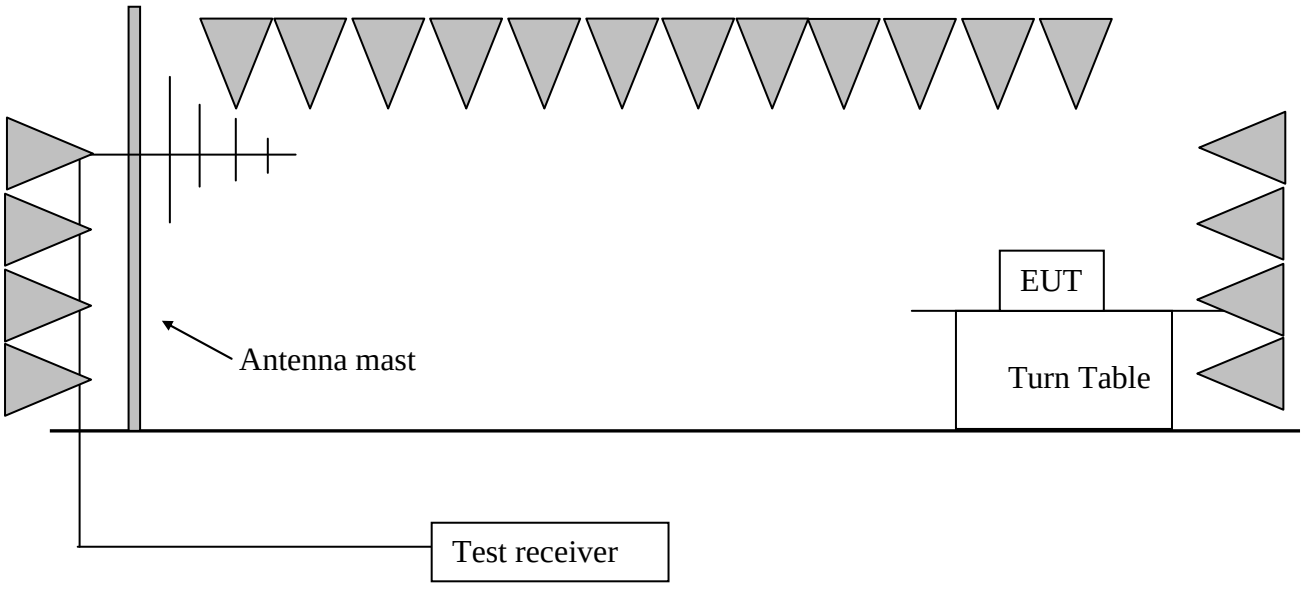
3.1 Test limit

Fundamental Frequency (MHz)	Fundamental limit (dBuV/m)	Harmonic limit (dBuV/m)
☐902 - 928	94	54
☒2400 - 2483.5	94	54
☐5725 - 5875	94	54
☐24000 - 24250	108	68

The radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

3.2 Test Configuration



3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 100kHz, VBW = 300kHz (30MHz~1GHz for PK)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);
RBW = 1MHz, VBW = 10Hz (>1GHz for AV);

3.4 Test protocol

Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	2454.02	34.50	49.30	94.00	44.70	PK
H	610.23	21.40	26.40	46.00	19.60	PK
H	2390.00	34.40	47.90	54.00	6.10	PK
H	2491.58	34.80	47.10	54.00	6.90	PK
V	2440.82	-3.50	48.70	94.00	45.30	PK
V	610.23	21.40	28.33	46.00	17.67	PK
V	5132.26	-2.90	47.20	54.00	6.80	PK
V	7643.28	3.30	44.80	54.00	9.20	PK

Remark: 1. For fundamental emission test, no pre-amplifier is employed.
2. The Pulse-repetition frequency for fundamental emission is higher than 20Hz. Therefore, the QP detector can be applied for fundamental emission test.
3. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
4. Corrected Reading = Original Receiver Reading + Correct Factor
5. Margin = limit – Corrected Reading
6. If the PK reading is lower than AV limit, the AV test can be elided.
7. The shaded data is the fundamental emission.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB, Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV. Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m, then Margin = 54 -10.20 = 43.80dBuV/m

4. Assigned bandwidth (20dB bandwidth)

Test result: **Pass**

4.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band as clause 3.1 shows.

4.2 Test Configuration

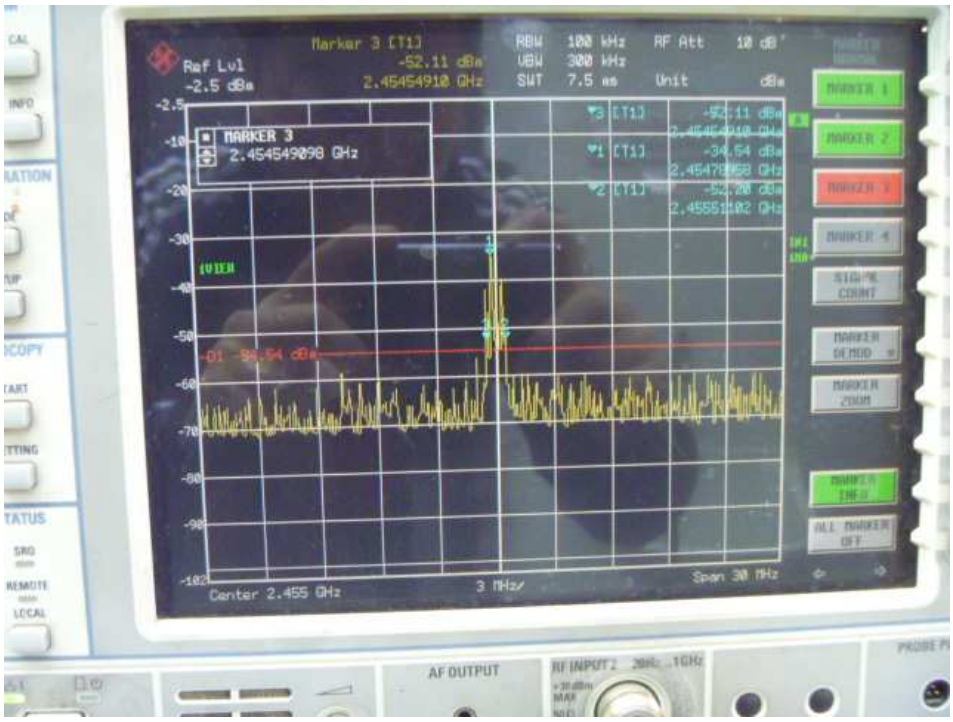
See clause 3.2.

4.3 Test procedure and test setup

The 20dB Bandwidth per FCC §15.215(c) is measured using the Spectrum Analyzer.

4.4 Test protocol

20dB bandwidth (MHz)	Permitted band (MHz)	Result
2454.5-2455.5	2400.00-2483.50	Pass



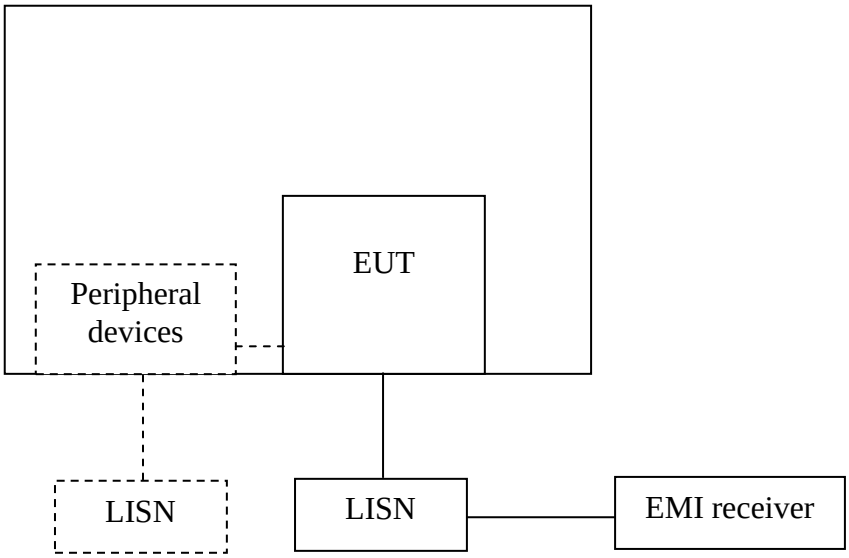
5. Power line conducted emission

Test result: **NA**

5.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

5.2 Test configuration



☐ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

5.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

5.4 Test protocol

Frequency (MHz)	LISN Factor (dB)	Cable Loss (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
			QP	AV	QP	AV	QP	AV
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Remark: 1. Corrected Reading = LISN Factor (dB) + Cable Loss (dB) + receiver reading. 2. Margin (dB) = Limit - Corrected Reading.								

6. Occupied Bandwidth

Test Status: NA

6.1 Test limit

None

6.2 Test Configuration

See clause 3.2.

6.3 Test procedure and test setup

The occupied bandwidth per RSS-Gen Issue 3 Clause 4.6.1 was measured using the Spectrum Analyzer.

6.4 Test protocol

Temperature	:	°C
Relative Humidity	:	%

7. Spurious emission for receiver

Test result: **NA**

7.1 Test limit

The spurious emission shall test through 3 times tuneable or local oscillator frequency whichever is the higher, without exceeding 40 GHz.
1) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2nW per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5nW above 1 GHz.
2) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

7.2 Test Configuration

Please refer to clause 3.2

7.3 Test procedure and test setup

Please refer to clause 3.2

7.4 Test protocol

Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = limit – Corrected Reading

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Original Receiver Reading = 10dBuV.
Then Correct Factor = 30.20 + 2.00 = 32.20dB/m; Corrected Reading = 10dBuV + 32.20dB/m = 42.20dBuV/m
Assuming limit = 54dBuV/m, Corrected Reading = 42.20dBuV/m, then Margin = 54 -42.20 = 11.80dBuV/m