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Pacific Cycle Inc.

RF TEST REPORT

Report Type:
FCC Part 15.247 & ISED RSS-247 RF report

Model:
KT1545I

REPORT NUMBER:
191100696SHA-001

ISSUE DATE:
Jan 14, 2020

DOCUMENT CONTROL NUMBER:
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TEST REPORT

Report no.: 191100696SHA-001

Applicant:	Pacific Cycle Inc. 4902 hammersley Road madison, WI 53711,USA
Manufacturer:	PINGHU WEIKESI CHILDREN TOYS CO.,LTD No.358 Yousheng Duan, Provincial Highway 01, Dushan Harbor Town, Pinghu, Zhejiang, China
FCC ID:	2ABGL-009

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:
47CFR Part 15 (2018): Radio Frequency Devices (Subpart C) **ANSI C63.10 (2013):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices **RSS-247 Issue 2 (February 2017):** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices **RSS-Gen Issue 5 (April 2018):** General Requirements for Compliance of Radio Apparatus

PREPARED BY:	**REVIEWED BY:**
Project Engineer Stephanie Zhang	Reviewer Wakeyou Wang

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TEST REPORT

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TEST REPORT

Revision History

Report No.	Version	Description	Issued Date
191100696SHA-001	Rev. 01	Initial issue of report	Jan 14, 2020

Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
20 dB Bandwidth	15.247(a)(1)	RSS-247 Issue 2 Clause 5.1	Pass
Carrier Frequency Separation	15.247(a)(1)	RSS-247 Issue 2 Clause 5.1	Pass
Output power	15.247(b)(1)	RSS-247 Issue 2 Clause 5.4	Pass
Radiated Emissions	15.205 & 15.209	RSS-Gen Issue 5 Clause 8.9&8.10	Pass
Conducted Spurious Emissions & Band Edge	15.247(d)	RSS-247 Issue 2 Clause 5.5	Pass
Power line conducted emission	15.207	RSS-Gen Issue 5 Clause 8.8	Pass
Number of Hopping Frequencies	15.247(a)(1)(iii)	RSS-247 Issue 2 Clause 5.1	Pass
Dwell time	15.247(a)(1)(iii)	RSS-247 Issue 2 Clause 5.1	Pass
Occupied bandwidth	-	RSS-Gen Issue 5 Clause 6.6	Tested
Antenna requirement	15.203	-	Pass

Notes: 1: NA =Not Applicable

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	6V Luxury Chevy Colorado Camo
Type/Model:	KT1545I
Description of EUT:	This is a toy car with Bluetooth module. There is only one model.
Rating:	Battery Charger: Input 120V,0.2A,50/60Hz; output:7VDC,0.8A
Category of EUT:	Class B
EUT type:	☐ Table top ☒ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	11/10/2019
Date of test:	11/10/2019 – 12/29/2019

1.2 Technical Specification

Frequency Range:	2400MHz ~ 2483.5MHz
Support Standards:	Bluetooth 4.2 (BR+EDR)
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Type of Modulation:	GFSK, π/4 DQPSK
Channel Number:	79 (0 - 78)
Channel Separation:	1 MHz
Antenna:	PIFA Antenna, -0.58 dBi

1.3 Frequency Hopping System Requirement

Test Requirement: Section 15.247 (a)(1), (g), (h) requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

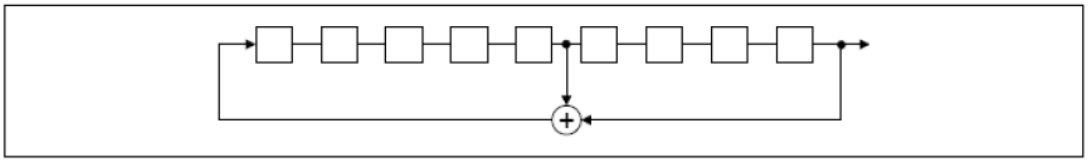
Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1)

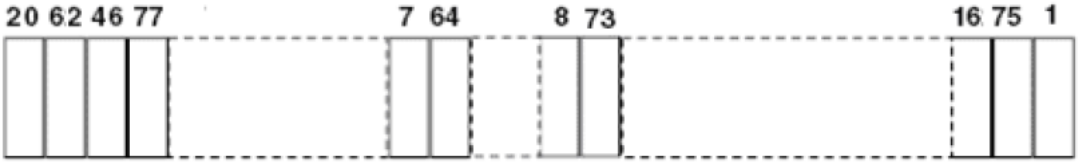
According to Bluetooth Core Specification, the pseudorandom sequence may be generated in a nine stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs;
i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 2^9 -1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.
According to Bluetooth Core Specification, Bluetooth receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any Bluetooth transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g)

According to Bluetooth Core Specification, the Bluetooth system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h)

According to Bluetooth Core specification, the Bluetooth system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.
According to the Bluetooth Core specification, the Bluetooth system is designed not have the ability to coordinate with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

1.4 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN1175
	IC Registration Lab Registration code No.: 2042B-1
	VCCI Registration Lab Registration No.: R-4243, G-845, C-4723, T-2252
	NVLAP Accreditation Lab NVLAP LAB CODE: 200849-0
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2018)
ANSI C63.10 (2013)
RSS-247 Issue 2 (February 2017)
RSS-Gen Issue 5 (April 2018)

2.2 Mode of operation during the test

While testing the transmitter mode of the EUT, the internal modulation is applied.
All the functions of the host device except the BT module were set on stand-by mode.

The test setting software is offered by the manufactory. The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

The worst-case modulation configuration:

Worst Modulation Used for Conformance Testing			
Bluetooth Mode	**Data Rate**	**Packet Type**	**Worst Mode**
GFSK	BR-1Mbps	DH1,DH3,DH5	**BR-1Mbps DH5** EDR-2Mbps 2DH5
π/4 DQPSK	EDR-2Mbps	2DH1,2DH3,2DH5	
Note: The BR-1Mbps DH5 mode was chosen for radiation emission bellow 1GHz and Conducted emission testing as representative in this report.			

The power setting parameter:

The worst-case power setting parameter			
Test software Version	CMD Command		
Modulation Mode	2402MHz	2441MHz	2480MHz
BR-1Mbps	4	4	4
EDR-2Mbps	4	4	4

Radiated test mode: EUT transmitted signal with BT antenna;
Conducted test mode: EUT transmitted signal from BT RF port connected to SPA directly;

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	HP ProBook 6470b	100-240V AC, 50/60Hz FCC DOC

2.5 Test environment condition:

Test items	Temperature	Humidity
20 dB Bandwidth	13°C	52% RH
Output power		
Carrier Frequency Separation		
Number of Hopping Frequencies		
Dwell time		
Conducted Spurious Emissions & Band Edge		
Power line conducted emission	12°C	52% RH
Radiated Emissions	12°C	51% RH

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESCS 30	EC 2107	2020-07-15
☑	A.M.N.	R&S	ESH2-Z5	EC 3119	2020-11-29
☑	Shielded room	Zhongyu	-	EC 2838	2020-06-13
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESIB 26	EC 3045	2020-09-11
☑	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2020-12-10
☑	Horn antenna	R&S	HF 906	EC 3049	2020-11-16
☐	Horn antenna	ETS	3117	EC 4792-1	2020-02-25
☐	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2020-07-09
☑	Pre-amplifier	R&S	Pre-amp 18	EC5881	2020-09-11
☑	Semi-anechoic chamber	Albatross project	-	EC 3048	2020-12-10
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2020-03-05
☑	Power sensor	Agilent	U2021XA	EC 5338-1	2020-03-05
☐	Vector Signal Generator	Agilent	N5182B	EC 5175	2020-03-05
☐	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2020-03-05
☑	Test Receiver	R&S	ESCI 7	EC 4501	2020-09-12
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3323	2020-06-14
☑	Pressure meter	YM3	Shanghai Mengde	EC 3320	2020-06-28

2.7 Measurement uncertainty

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

Test item	Measurement uncertainty
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

3 20dB bandwidth

Test result: Pass

3.1 Limit

☐ Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

☒ Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

3.2 Measurement Procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency.The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level.
d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “−xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
f) Set detection mode to peak and trace mode to max hold.
g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
h) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).
j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “−xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “−xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker