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Pacific Cycle Inc.

RF TEST REPORT

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

Model:
KT1510
KT1419I
KT1583AZ
KT1419AZA

REPORT NUMBER:
200600768SHA-001

ISSUE DATE:
June 16, 2020

DOCUMENT CONTROL NUMBER:
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TEST REPORT

Report no.: 200600768SHA-001

Applicant:	Pacific Cycle Inc. 4902 hammersley Road madison, WI 53711
Manufacturer:	Shanghai Chien Ti Motor Co., Ltd No.1158, Yuanqu Road, Jiading District, Shanghai, China.
FCC ID:	2ABGL-004

SUMMARY:

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

47CFR Part 15 (2019): 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 (March 2019) Amendment 1: General Requirements for Compliance of Radio Apparatus

PREPARED BY:	**REVIEWED BY:**
Project Engineer Eric Li	Reviewer Daniel Zhao

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Content

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Revision History

Report No.	Version	Description	Issued Date
200600768SHA-001	Rev. 01	Initial issue of report	June 16, 2020

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Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Radiated Emissions	15.205 & 15.209	RSS-Gen Issue 5 Clause 8.9&8.10	Pass
Power line conducted emission	15.207	RSS-Gen Issue 5 Clause 8.8	Pass

Notes: 1: NA =Not Applicable

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	6V Luxury toy car
Type/Model:	KT1510, KT1419I, KT1583AZ, KT1419AZA
Description of EUT:	EUT is a toy car with Bluetooth function. There are four models, they are the same except they have different colors, model name and enclosure shape. So we test the model of KT1510 as representative and list the worst results in this report.
Rating:	Adapter: JT-DC075V0500(I) Input: 120V~ 60Hz, 0.20A Output: 7.5Vdc 500mA Working: 6V
EUT type:	☐ Tabletop ☒ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	June 10, 2020
Date of test:	June 12, 2020~ June 15, 2020

1.2 Technical Specification

Frequency Band:	2400MHz ~ 2483.5MHz
Support Standards:	Bluetooth BR+EDR
Operating Frequency:	2402MHz to 2480MHz
Modulation Technique:	Frequency Hopping Spread Spectrum (FHSS)
Type of Modulation:	GFSK, π/4-DQPSK
Channel Number:	79 (0 - 78)
Channel Separation:	1 MHz
Antenna:	PCB Antenna, -0.58dBi

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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.

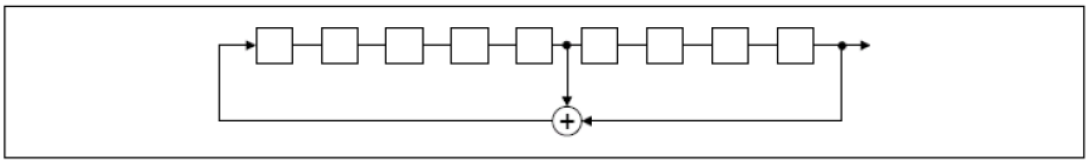
Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented 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 stages 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.

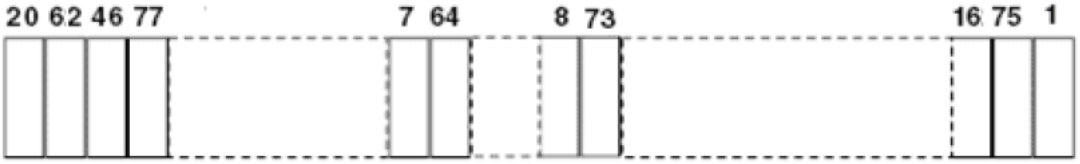
- Number of shift register stages: 9
- Length of pseudo-random sequence: 2^9 -1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

TEST REPORT

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.

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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 CAB identifier.: CN0051
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2019)
ANSI C63.10 (2013)
KDB 558074 (v05r02)
RSS-247 Issue 2 (February 2017)
RSS-Gen Issue 5 (March 2019) Amendment 1

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.

Software name	Manufacturer	Version	Supplied by
FCC Assistant	/	/	Client

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
2400-2483.5	GFSK	2402	2441	2480
	π/4-DQPSK	2402	2441	2480
	/	/	/	/

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	
8DPSK	/	/	
Note: The BR-1Mbps DH5 mode was chosen for radiation emission bellow 1GHz and Conducted emission testing as representative in this report.			

Power Setting parameter			
Mode	Channel		
	Lowest	Middle	Highest
GFSK	10	10	10
π/4-DQPSK	10	10	10
8DPSK	/	/	/

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	DELL 5480	-

2.5 Test environment condition:

Test items	Temperature	Humidity
Radiated Emissions	22°C	53%RH
Power line conducted emission	22°C	52%RH

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2.6 Instrument list

Conducted Emission/Disturbance Power/Tri-loop Test/CDN method					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2020-07-14
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2020-11-29
☐	A.M.N.	R&S	ENV 216	EC 3393	2020-07-14
☐	A.M.N.	R&S	ENV4200	EC 3558	2021-06-11
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2020-09-16
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2020-12-10
☒	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2021-06-11
☒	Horn antenna	R&S	HF 906	EC 3049	2020-11-16
☐	Horn antenna	ETS	3117	EC 4792-1	2021-02-25
☒	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2020-07-09
☐	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2021-03-14
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2021-03-04
☐	Power sensor	Agilent	U2021XA	EC 5338-1	2021-03-04
☐	Vector Signal Generator	Agilent	N5182B	EC 5175	2021-03-04
☐	Universal Radio Communication Tester	R&S	CMW500	EC5944	2020-12-22
☐	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2021-03-04
☐	Mobile Test System	Litepoint	Iqxel	EC 5176	2021-01-08
☐	Test Receiver	R&S	ESCI 7	EC 4501	2020-09-16
☐	Climate chamber	GWS	MT3065	EC 6021	2020-07-04
☐	Spectrum Analyzer	Keysight	N9030A	EC 6078	2021-06-11
Tet Site					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☐	Shielded room	Zhongyu	-	EC 2838	2021-01-13
☐	Shielded room	Zhongyu	-	EC 2839	2021-01-13

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☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2020-06-31
☐	Fully-anechoic chamber	Albatross project	-	EC 3047	2020-06-31
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2021-03-10
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3481	2020-12-22
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 5198	2021-02-27
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3325	2021-04-07
☐	Pressure meter	YM3	Shanghai Mengde	EC 3320	2020-07-14

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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

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3 Radiated Emissions

Test result: **Pass**

3.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

3.2 Measurement Procedure

For Radiated emission below 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

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For Radiated emission above 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c) 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.

d) 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.

e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f) The test-receiver system was set to peak and average detector function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were evaluated and the worst-case emissions were reported

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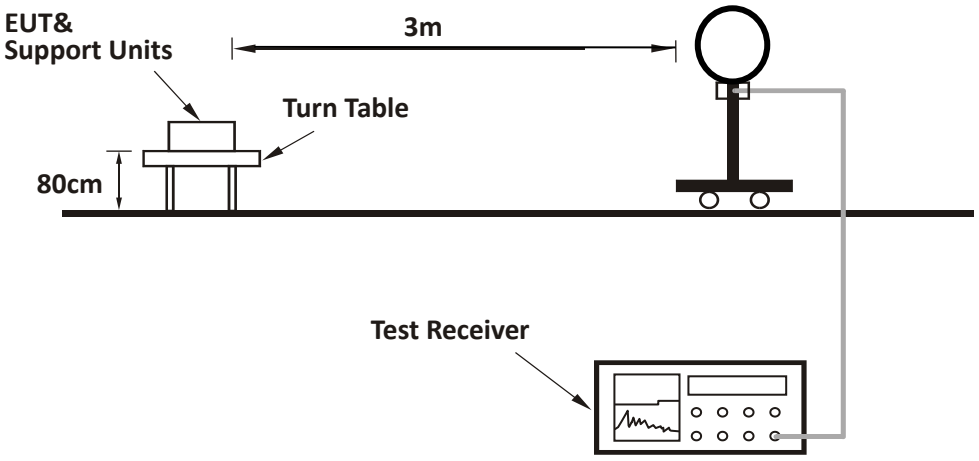
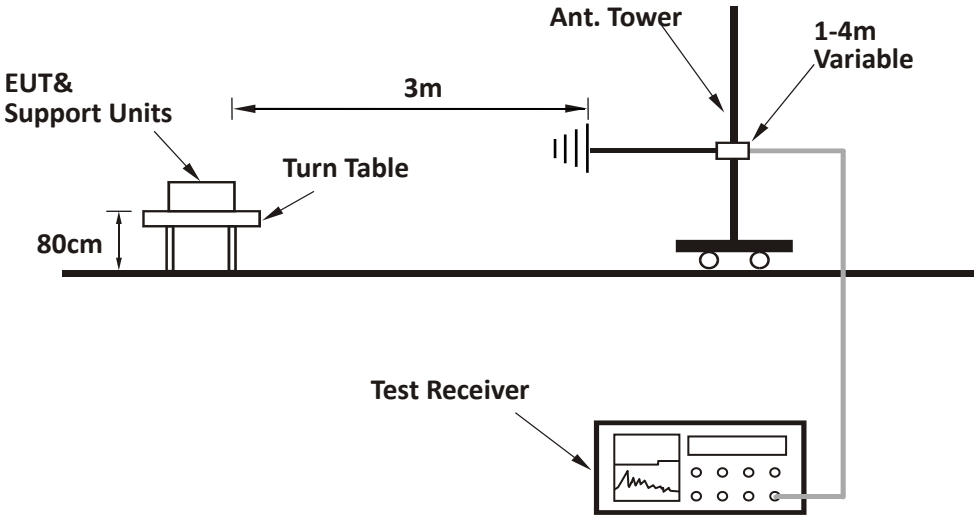
3.3 Test Configuration

For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



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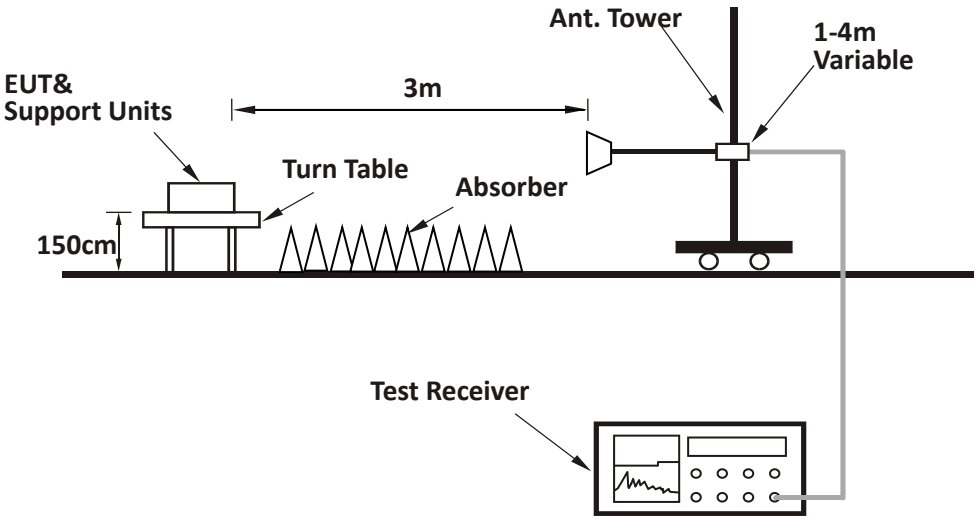
For Radiated emission above 1GHz:



3.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Test data below 1GHz:

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector Methods
H	30.00	21.40	19.40	40.00	18.60	PK
H	41.66	14.60	12.80	40.00	25.40	PK
H	409.06	21.40	17.70	46.00	24.60	PK
H	554.85	25.30	20.30	46.00	20.70	PK
H	743.41	28.10	22.10	46.00	17.90	PK
H	955.29	31.30	24.20	46.00	14.70	PK
V	30.00	22.50	19.40	40.00	17.50	PK
V	164.13	21.30	11.00	43.50	22.20	PK
V	411.00	22.20	17.80	46.00	23.80	PK
V	552.91	25.70	20.30	46.00	20.30	PK
V	741.46	28.80	22.10	46.00	17.20	PK
V	912.53	30.60	23.70	46.00	15.40	PK

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Test result of 1GHz to 25GHz:

GFSK (DH5) Modulation:

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H/V	2402.00	82.30	Fundamental	/	PK
	H/V	2390.00	51.30	74.00	22.70	PK
	H/V	4804.00	47.20	74.00	26.80	PK
M	H/V	2441.00	82.20	Fundamental	/	PK
	H/V	4882.00	47.40	74.00	26.60	PK
H	H/V	2480.00	82.50	Fundamental	/	PK
	H/V	2483.50	51.70	74.00	22.30	PK
	H/V	4960.00	47.60	74.00	26.40	PK

π/4DQPSK (2DH5) Modulation:

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H/V	2402.00	82.50	Fundamental	/	PK
	H/V	2390.00	51.30	74.00	22.70	PK
	H/V	4804.00	47.60	74.00	26.40	PK
M	H/V	2441.00	82.50	Fundamental	/	PK
	H/V	4882.00	47.60	74.00	26.40	PK
H	H/V	2480.00	83.40	Fundamental	/	PK
	H/V	2483.50	51.90	74.00	22.10	PK
	H/V	4960.00	47.70	74.00	26.30	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,
Limit = 40.00dBuV/m.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

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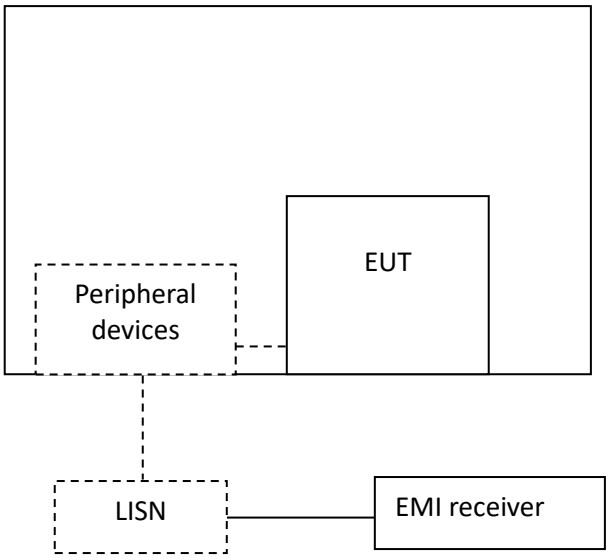
4 Power line conducted emission

Test result: **Pass**

4.1 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.		

4.2 Test Configuration



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4.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

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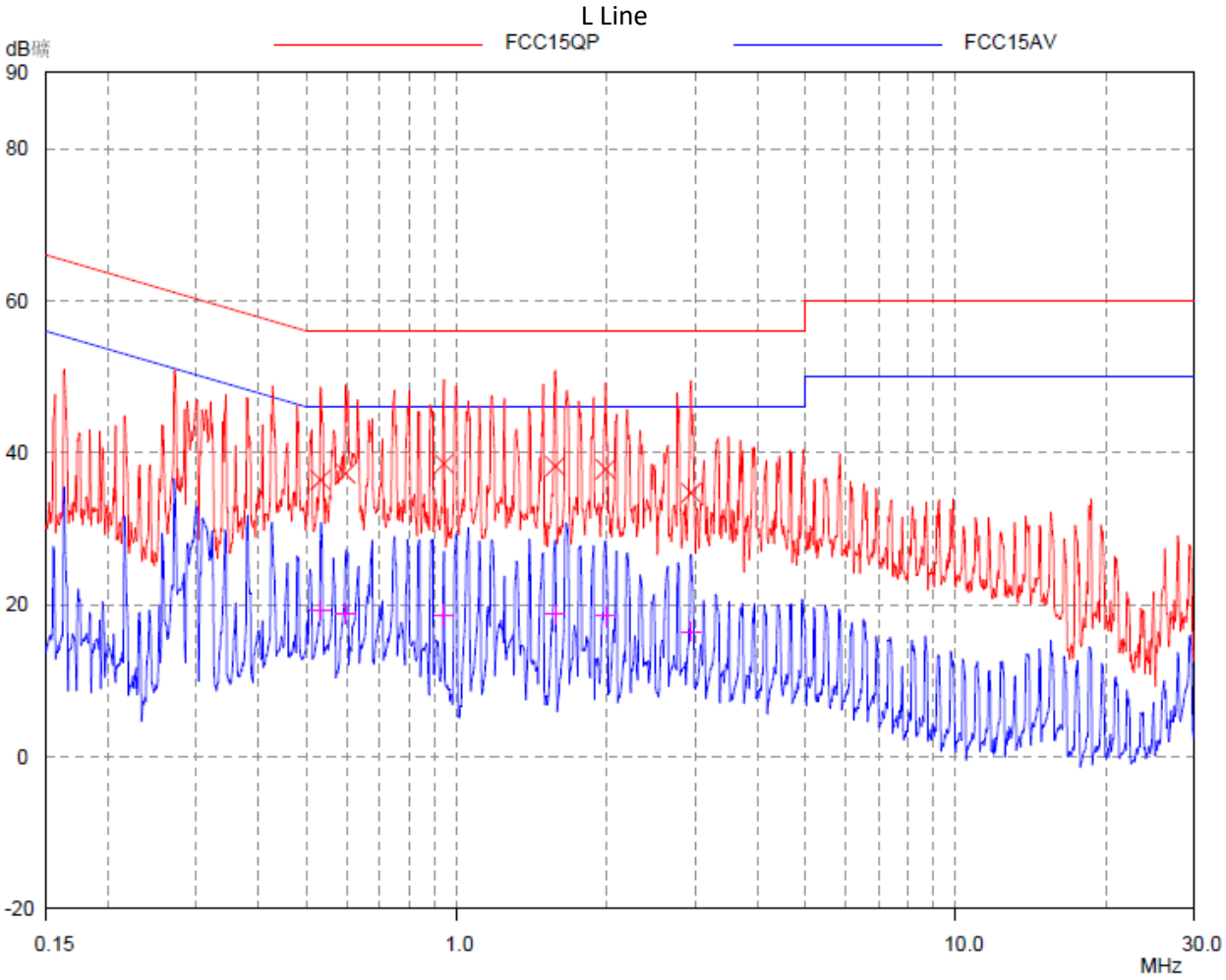
4.4 Test Results of Power line conducted emission

Test Curve:



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.53	36.42	56.00	19.58	19.32	46.00	26.68
0.60	37.26	56.00	18.74	18.81	46.00	27.19
0.94	38.55	56.00	17.45	18.59	46.00	27.41
1.57	38.23	56.00	17.77	18.75	46.00	27.25
1.99	37.83	56.00	18.17	18.50	46.00	27.50
2.95	34.74	56.00	21.26	16.49	46.00	29.51

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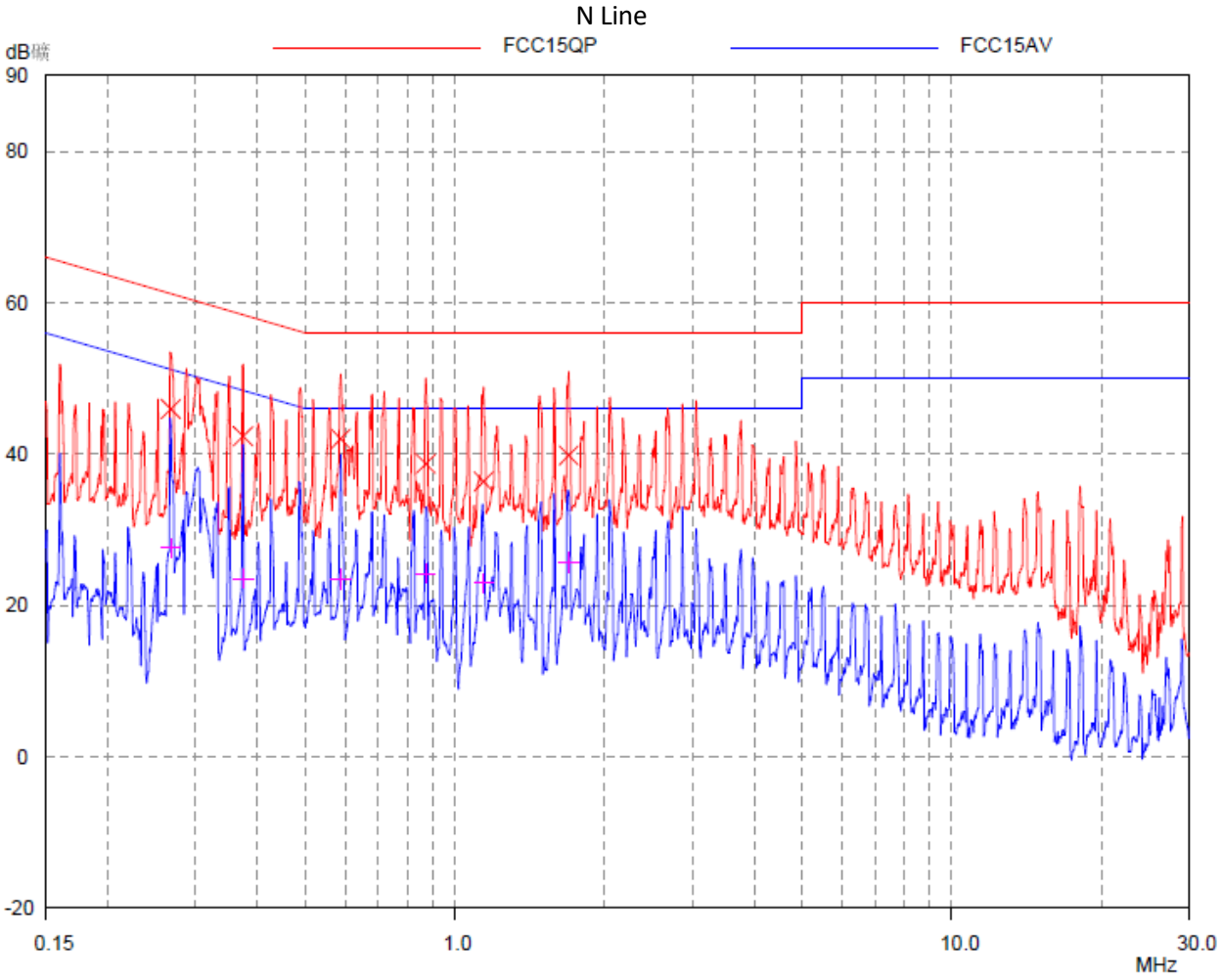

Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.27	45.96	61.19	15.23	27.62	51.19	23.57
0.37	42.37	58.41	16.04	23.59	48.41	24.82
0.59	42.01	56.00	13.99	23.52	46.00	22.48
0.87	38.71	56.00	17.29	24.23	46.00	21.77
1.14	36.39	56.00	19.61	22.90	46.00	23.10
1.69	39.83	56.00	16.17	25.72	46.00	20.28

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

********** END **********