RF TEST REPORT

Report No.	:	SSP26060162-1R
Applicant	:	Zeroplus Technology Co., Ltd.
Product Name	:	TPAX Wireless Controller
Model Name	:	HD-6800
Test Standard	:	Article 2 Paragraph 1 of Item 19
Date of Issue	:	2026-07-09

Shenzhen CCUT Quality Technology Co., Ltd.
1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China; (Tel.:+86-755-23406590 website: www.ccuttest.com)

This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen CCUT Quality Technology Co., Ltd.

Test Report Basic Information

Applicant.....:	Zeroplus Technology Co., Ltd.
Address of Applicant.....:	3F., No. 121, Jian 8th Rd., Zhonghe Dist., New Taipei City 23585, Taiwan (R.O.C.)
Manufacturer.....:	Zeroplus Technology Co., Ltd.
Address of Manufacturer.....:	3F., No. 121, Jian 8th Rd., Zhonghe Dist., New Taipei City 23585, Taiwan (R.O.C.)
Product Name.....:	TPAX Wireless Controller
Brand Name.....:	TPAX
Main Model.....:	HD-6800
Series Models.....:	-
Test Standard.....:	Article 2 Paragraph 1 of Item 19 MIC notification No.88 of 2004, Annex 43
Date of Test .....:	2026-06-06 to 2026-07-04
Test Result.....:	PASS
Tested By .....:	Coke Huang (Coke Huang)
Reviewed By.....:	Lorzix Luo (Lorzix Luo)
Authorized Signatory.....:	Lahm Peng (Lahm Peng)

Shenzhen CCUT Quality Technology Co., Ltd. APPROVED

Note : This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen CCUT Quality Technology Co., Ltd.. All test data presented in this test report is only applicable to presented test sample.

CONTENTS

1. General Information **5**
1.1 Product Information 5
1.2 Test Setup Information 6
1.3 Test Conditions 6
1.4 Compliance Standards 7
1.5 Test Facilities 7
1.6 List of Measurement Instruments 8
1.7 Measurement Uncertainty 8
2. Summary of Test Results **9**
3. Dwell Time **10**
3.1 Standard and Limit 10
3.2 Test Procedure 10
3.3 Test Data and Results 10
4. Frequency Tolerance **12**
4.1 Standard and Limit 12
4.2 Test Procedure 12
4.3 Test Data and Results 12
5. Antenna and EIRP Power **13**
5.1 Standard and Limit 13
5.2 Test Procedure 13
5.3 Test Data and Results 13
6. Occupied Bandwidth **14**
6.1 Standard and Limit 14
6.2 Test Procedure 14
6.3 Test Data and Results 14
7. Transmitter Spurious Emissions **15**
7.1 Standard and Limit 15
7.2 Test Procedure 15
7.3 Test Data and Results 15
8. Receiver Spurious Emissions **16**
8.1 Standard and Limit 16
8.2 Test Procedure 16
8.3 Test Data and Results 16
9. Interference Prevention Function **17**
9.1 Standard and Limit 17
9.2 Test Procedure 17
9.3 Test Data and Results 17

複製禁止

Revision History

Revision	Issue Date	Description	Revised By
V1.0	2026-07-09	Initial Release	Lahm Peng

複製禁止

1. General Information

1.1 Product Information

Product Name:	TPAX Wireless Controller
Trade Name:	TPAX
Test Model:	HD-6800
Series Models:	-
Rated Voltage:	DC 3.7V by battery, USB 5V Charging
Battery:	DC 3.7V, 1000mAh
Hardware Version:	V1.0
Software Version:	V1.0
Note 1: The test data is gathered from a production sample, provided by the manufacturer.	

Wireless Specification	
Wireless Standard:	Bluetooth V5.3, BR/EDR
Operating Frequency:	2402MHz ~ 2480MHz
Number of Channel:	79
Channel Separation:	1MHz
Modulation:	GFSK, Pi/4 DQPSK, 8DPSK
Antenna Gain:	0dBi
Type of Antenna:	PCB Antenna

List of Channels							
No. of Channel	Frequency (MHz)	No. of Channel	Frequency (MHz)	No. of Channel	Frequency (MHz)	No. of Channel	Frequency (MHz)
01	2402	21	2422	41	2442	61	2462
02	2403	22	2423	42	2443	62	2463
~	~	~	~	~	~	~	~
~	~	~	~	~	~	~	~
19	2420	39	2440	59	2460	79	2480
20	2421	40	2441	60	2461	--	

1.2 Test Setup Information

List of Test Modes		
Test Mode	Description	Remark
TM1	DH5(GFSK)	2402MHz/2441MHz/2480MHz
TM2	2DH5(Pi/4 DQPSK)	2402MHz/2441MHz/2480MHz
TM3	3DH5(8DPSK)	2402MHz/2441MHz/2480MHz
TM4	Hopping	2402MHz~2480MHz
Note 1: DH1/DH3/DH5, 2DH1/DH3/DH5, 3DH1/DH3/DH5 and other test modes have been tested, and this time only the worst result DH5/2DH5/3DH5 is shown.		

List and Details of Auxiliary Cable			
Description	Length (cm)	Shielded/Unshielded	With/Without Ferrite
-	-	-	-
-	-	-	-

List and Details of Auxiliary Equipment			
Description	Manufacturer	Model	Serial Number
-	-	-	-
-	-	-	-

1.3 Test Conditions

Supply Voltage			
	DC Input Voltage V	DC Voltage V	Percent
Normal(NV)	3.7	3.3	
+10%(HV)	4.2	3.3	0%
-10%(LV)	3.3	3.3	0%

Note 1: When the input voltage is reduced or increased by 10%, the regulator voltage changes of less than 1%. So the following test items are conducted in the normal voltage.
Note 2: The regulator voltage is integral within U1 (GH951).
Note 3: 3.3VDC from the RF IC, for extreme voltage test, we have tested the relationship between the external power supply and RF IC power supply. Base on the test results, only the normal voltage was selected to perform all items.

Test Environment					
Temperature	21°C	Humidity	52%	Atmospheric Pressure	1013.0mbar

1.4 Compliance Standards

Compliance Standards	
Article 2 Paragraph 1 of Item 19	Low Power Data Communication System in the 2.4GHz band (2400-2483.5MHz)
All measurements contained in this report were conducted with all above standards	
According to standards for test methodology	
MIC notification No.88 of 2004, Annex 43 (2023-11-08)	Low Power Data Communication System in the 2.4GHz band (2400-2483.5MHz)
Maintenance of compliance is the responsibility of the manufacturer or applicant. Any modification of the product, which result is lowering the emission, should be checked to ensure compliance has been maintained.	

1.5 Test Facilities

Laboratory Name:	**Shenzhen CCUT Quality Technology Co., Ltd.** 1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China
CNAS Laboratory No.:	L18863
A2LA Certificate No.:	6983.01
FCC Registration No:	583813
ISED Registration No.:	CN0164

1.6 List of Measurement Instruments

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Conducted RF Testing					
RF Test System	MWRFTest	MW100-RFCB	220418SQS-37	2025-07-16	2026-07-15
Spectrum Analyzer	KEYSIGHT	N9020A	ATO-90521	2025-07-16	2026-07-15
Signal Generator	Agilent	N5182A	MY47071192	2025-07-15	2026-07-14
Power Meter	MRT	MW100-RFCB	MW220418SQS-37	2025-07-15	2026-07-14

Calibration agency: Guangzhou LiSai Metrology & Test Co., Ltd.

Address: No.8 South Street, Shiji Institute, Guangzhou, Guangdong, China

Calibration method: Through the standard signal source calibration, the results meet the requirements.

Calibration method is based on: Radio law article 24-2, Paragraph 4, Item 2 section c.

Calibration agency comply with designated calibration agency under Article 102-18 paragraph (1).

1.7 Measurement Uncertainty

Test Item	Conditions	Uncertainty
Dwell Time	9kHz ~ 6GHz	±1.0 %
Frequency Tolerance	9kHz ~ 6GHz	±1 E-7
Conducted Output Power	9kHz ~ 6GHz	±0.50 dB
Occupied Bandwidth	9kHz ~ 6GHz	±4.0 %
Conducted Spurious Emission	9kHz ~ 26GHz	±1.32 dB

2. Summary of Test Results

MIC Rule	Description of Test Item	Result
Article 2 Paragraph 1 of Item 19	Dwell Time	Passed
	Frequency Tolerance	Passed
	Antenna and EIRP Power	Passed
	Occupied Bandwidth	Passed
	Transmitter Spurious Emissions	Passed
	Receiver Spurious Emissions	Passed
	Interference Prevention Function	Passed
Passed: The EUT complies with the essential requirements in the standard Failed: The EUT does not comply with the essential requirements in the standard N/A: Not applicable		
The Appendix A is a part of the test report, including EUT external photos, internal photos, test photos and label information; The Appendix B is a part of the test report, including test data and test plots for RF testing.		

3. Dwell Time

3.1 Standard and Limit

According to Article 2 Paragraph 1 of Item 19, the dwell time shall not exceed 0.4sec or less.

3.2 Test Procedure

(1)Set the spectrum analyzer and wait the hopping signal with the hopping frequency.
Spectrum analyzer setting up is as follows.

Center frequency	Hopping test frequency
Sweep bandwidth	0Hz
Resoluble bandwidth	1MHz
Video bandwidth	1MHz
Trigger condition	Video trigger
Detection mode	Peak
Sweep times	10ms

(2) Read the pulse time of the pulse of the hopping frequency at hopping cycle using marker from the trace on the display.
(3) By means of the method same to the above (2), set the sweep times to 31.6s, read the burst count of the hopping frequency at hopping cycle(31.6s).
(4) Calculate the dwell time of the hopping frequency as follows, dwell time = (pulse time) x (burst count).
(5) Repeat the abovementioned procedures for each hopping frequency.

Test Setup Block Diagram

3.3 Test Data and Results

The dwell time within a test period second period in data mode is independent from the packet type (packet length). The calculation for a test period is follows:
Dwell time= Spread Factor/79*Duty cycle*0.4, Duty cycle = [on time/total time] x 100%.

Test with all modes the worst is DH5, 2DH5, 3DH5 for GFSK, Pi/4 DQPSK, 8DPSK.

Duty cycle and Diffusion Bandwidth test plots please refer to the section 1 and section 4 of the Appendix B.

Mode	Channel (MHz)	Packet	Duty cycle (%)	Dwell Time (ms)	Limit (ms)	Result
GFSK	2402	DH5	76.8	275.640	400	Pass
	2441	DH5	76.8	275.640	400	Pass
	2480	DH5	76.83	275.748	400	Pass
Pi/4 DQPSK	2402	2DH5	76.96	277.329	400	Pass
	2441	2DH5	76.99	277.437	400	Pass
	2480	2DH5	76.99	277.437	400	Pass
8DPSK	2402	3DH5	77.01	277.817	400	Pass
	2441	3DH5	77.04	277.925	400	Pass
	2480	3DH5	77.01	277.817	400	Pass

Mode	Diffusion Bandwidth (MHz)	Data Rate (M)	Spread Factor (MHz)
GFSK	70.884	1	70.884
Pi/4 DQPSK	71.170	1	71.170
8DPSK	71.249	1	71.249
Note: Spread Factor = Diffusion Bandwidth (90% Emission Bandwidth)/ Data Rate			

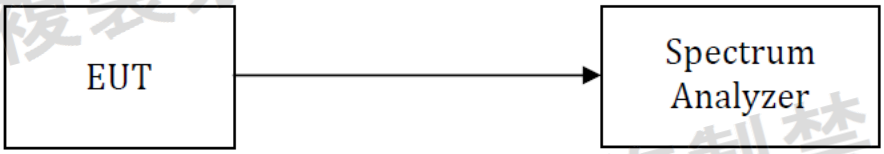
4. Frequency Tolerance

4.1 Standard and Limit

According to Article 2 Paragraph 1 of Item 19, the maximum permit tolerance of frequency is ±50ppm.

4.2 Test Procedure

(1)Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
(2) Set center frequency of spectrum analyzer = operating frequency.
(3) Set the spectrum analyzer as RBW, VBW=10KHz, Span = 2MHz.
(4) 'Maximum Hold' mode may be used to accumulate the measurement result over several scans provided emission is repetitive in nature.
(5)Repeat above procedures until all frequency measured was complete.



Test Setup Block Diagram

4.3 Test Data and Results

Please refer to the section 2 of the Appendix B.

5. Antenna and EIRP Power

5.1 Standard and Limit

According to Article 2 Paragraph 1 of Item 19.

(1) The maximum permit antenna power is 3mW/MHz, EIRP is 6.91dBm/MHz for FHSS.

(2) The maximum permit antenna power is 10mW/MHz, EIRP is 12.14 dBm/MHz for DSSS and OFDM with 20MHz bandwidth.

(3) The maximum permit antenna power is 5mW/MHz, EIRP is 9.13dBm/MHz for OFDM with 40MHz bandwidth.

(4) The maximum permit antenna power is 10mW or less, EIRP is 12.14 dBm for Other method(except FHSS, DSSS and OFDM).

(5) The maximum permit tolerance is +20%.

5.2 Test Procedure

(1) Connect high frequency power meter to the RF output of the EUT, measure the total power by Power Meter in a state of hopping mode.

(2) Record the reading on power meter as antenna output power.

(3) Calculate the mean power per 1MHz by dividing the reading level by spread bandwidth.

Test Setup Block Diagram

5.3 Test Data and Results

Modulation:	Channel Power (mW)	Antenna Power (mW/MHz)	Limit (mW/MHz)	Antenna Power (dBm/MHz)	Antenna Gain (dBi)	EIRP (dBm/MHz)	EIRP Limit (dBm/MHz)
GFSK	0.34	0.005	3	-23.20	0	-23.20	6.911
π/4 DQPSK	0.34	0.005	3	-23.24	0	-23.24	6.911
8DPSK	0.34	0.005	3	-23.26	0	-23.26	6.911
Note 1: Antenna Power(mW/MHz) = Channel Power(mW) / Spread Bandwidth(MHz) Note 2: The duty cycle factor is considered in the test, channel power results have been added duty cycle factor.							

RF Output Power Tolerance:

Modulation:	Output Power (mW/MHz)	Rated Output Power (mW/MHz)	Tolerance (%)	Limit (%)
GFSK	0.005	1	-99.50	+20%
π/4 DQPSK	0.005	1	-99.50	+20%
8DPSK	0.005	1	-99.50	+20%
Note: Tolerance = (Output Power – Rated Output Power) / Rated Output Power * 100%				

6. Occupied Bandwidth

6.1 Standard and Limit

According to Article 2 Paragraph 1 of Item 19.
(1) The occupied bandwidth shall not exceed 83.5MHz for FHSS.
(2) The occupied bandwidth shall not exceed 26MHz for DSSS and OFDM with 20MHz bandwidth.
(3) The occupied bandwidth shall not exceed 40MHz for OFDM with 40MHz bandwidth.

6.2 Test Procedure

(1) Set up the spectrum analyzer as the follows:
Center frequency: Test frequency
Sweep bandwidth: 2 to 3.5 times of allowance
Resoluble bandwidth: less than 3% of allowance
Video bandwidth: Equivalent to resoluble bandwidth
Sweep time: Minimum time by which measuring accuracy is assured (In case of burst wave, 1 burst shall be contained per 1 sample)
Sampling points: More than 400 points
Sweep mode : Continuous sweeping
Detection mode: Positive peak
Display mode: Maximum holding
(2) Repeat the sweeping till no change was observed on the display and enter all values of data point to the computer as array variable.
(3) About all data, convert dB value to antilogarithm of electric power dimension.
(4) Add up the electric power of all data and record it as “Sum total of electric power”.
(5) Adding up data in order from the lowest frequency to upper frequencies, look for a limit point where the value reaches to 0.5% (5% in case of diffusion bandwidth) of “Sum total of electric power”. Convert the limit point to frequency and record as “Lowest limit frequency”.
(6) Adding up data in order from the highest frequency to lower frequencies, look for a limit point where the value reaches to 0.5% (5% in case of diffusion bandwidth) of “Sum total of electric power”. Convert the limit point to frequency and record as “Highest limit frequency”.
(7) Repeat above procedures until all frequency measured was complete.

Test Setup Block Diagram

6.3 Test Data and Results

Please refer to the section 5 of the Appendix B.

7. Transmitter Spurious Emissions

7.1 Standard and Limit

According to Article 2 Paragraph 1 of Item 19, the transmitter spurious emissions shall not exceeded the following limit:

(1) Below 2387MHz : 2.5μW/MHz

(2) 2387 to 2400MHz : 25μW/MHz

(3) 2483.5 through 2496.5MHz : 25μW/MHz

(4) Over 2496.5MHz : 2.5μW/MHz

7.2 Test Procedure

(1) A spectrum in case of conducted measurements, the radio device shall be connected to the measuring equipment via a suitable attenuator.

(2) The measurement equipment shall be set for peak hold mode of operation.

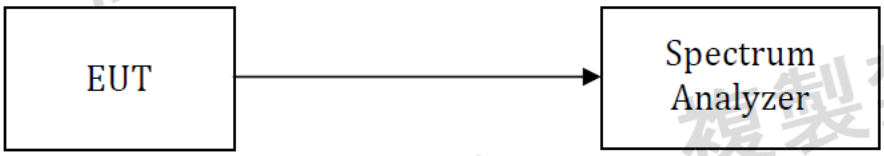
(3) the transmitter shall be operated at the highest output power, or, in the case of equipment able to operate at more than one power level, at the lowest and highest output powers;

(4) The resolution bandwidth shall be set to 100kHz from 10MHz to 1GHz, the resolution bandwidth shall be set to 1MHz above 1GHz , and the sweep time shall be set to auto mode, to ensure all major modulation products are captured.

(5) When the searched result is less than the specified limit, the maximum one shall be recorded, when the result is more than the specified limit, all measured values shall be recorded.

(6) This measurement shall be repeated with the transmitter in standby mode where applicable.

(7) Repeat above procedures until all frequency measured was complete.



Test Setup Block Diagram

7.3 Test Data and Results

Please refer to the section 6 of the Appendix B.

8. Receiver Spurious Emissions

8.1 Standard and Limit

According to Article 2 Paragraph 1 of Item 19, the receiver spurious emissions shall not exceeded the following limit:

(1) Below 1GHz : 4nW

(2) 1GHz or higher : 20nW

8.2 Test Procedure

(1) A spectrum in case of conducted measurements, the radio device shall be connected to the measuring equipment via a suitable attenuator.

(2) The measurement equipment shall be set for peak hold mode of operation.

(3) the transmitter shall be operated at the highest output power, or, in the case of equipment able to operate at more than one power level, at the lowest and highest output powers;

(4) The resolution bandwidth shall be set to 100kHz from 10MHz to 1GHz, the resolution bandwidth shall be set to 1MHz above 1GHz , and the sweep time shall be set to auto mode, to ensure all major modulation products are captured.

(5) When the searched result is less than the specified limit, the maximum one shall be recorded, when the result is more than the specified limit, all measured values shall be recorded.

(6) This measurement shall be repeated with the transmitter in standby mode where applicable.

(7) Repeat above procedures until all frequency measured was complete.

Test Setup Block Diagram

8.3 Test Data and Results

Please refer to the section 7 of the Appendix B.

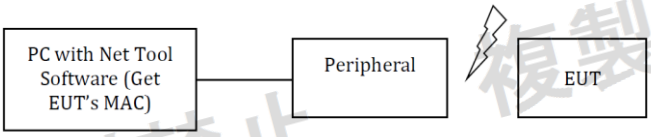
9. Interference Prevention Function

9.1 Standard and Limit

According to Article 2 Paragraph 1 of Item 19, the device shall have the function of automatic transmission or reception of identification code.

9.2 Test Procedure

(1) Set the EUT in the usual operation condition.
(2) The radio equipment with automatic transmitting function of identification code.
a. Transmit the assigned identification code from the radio equipment.
b. Confirm the identification code received by the demodulator.
(3) The radio equipment with automatic receiving function of identification code.
a. Transmit the assigned identification code from the opposite equipment.
b. Confirm that the usual communication is available.
c. Transmit the identification code distinct from the assigned one from the opposite equipment.
d. Confirm that the radio equipment is stopped or an indication is displayed as the identification code is different.
(4) The identification function shall be recorded.



Test Setup Block Diagram

9.3 Test Data and Results

Test Condition	Test Items	Test Result
NV	Transmitting Function of Identification Code	Good
	Receiving Function of Identification Code	Good
LV	Transmitting Function of Identification Code	Good
	Receiving Function of Identification Code	Good
HV	Transmitting Function of Identification Code	Good
	Receiving Function of Identification Code	Good

MAC address ID: 1c:52:16:a0:a3:e0

******* END OF REPORT *******