TEST REPORT

Report No.:	8328EU012613W
Applicant:	Shenzhen Rango Innovation Technology co., Ltd.
Address:	3/F, block A, Coolpad building, Gaoxin North 1st Road, Nanshan District, Shenzhen, Guangdong, China
Product Name:	Storm A2 Dongle
Model No.:	StormA2P
Trademark:	OXS
Test Standard(s):	MIC Notice No.88 Appendix No.43 Ordinance of MPT No.37, 1981: Article 2 paragraph 1 item (19)
Test Result:	Pass
Date of Receipt:	Mar. 26, 2025
Test Date:	Mar. 26, 2025 – Apr. 24, 2025
Date of Issue:	Apr. 28, 2025

ISSUED BY:

SHENZHEN EU TESTING LABORATORY LIMITED

SHENZHEN EU TESTING LABORATORY LIMITED APPROVED

Prepared by:	**Reviewed and Approved by:**
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Revision Record

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2 General Information

2.1 Applicant Information

Applicant	Shenzhen Rango Innovation Technology co., Ltd.
Address	3/F, block A, Coolpad building, Gaoxin North 1st Road, Nanshan District, Shenzhen, Guangdong, China

2.2 Manufacturer Information

Manufacturer	Shenzhen Rango Innovation Technology co., Ltd.
Address	3/F, block A, Coolpad building, Gaoxin North 1st Road, Nanshan District, Shenzhen, Guangdong, China

2.3 Factory Information

Factory	Dongguan Lule Electronic Technology Co.,Ltd
Address	Building 3, No. 12 Longhua Road, Dongcheng Street, Dongguan, Guangdong, China

2.4 General Description of E.U.T.

Product Name	Storm A2 Dongle
Model No. Under Test	StormA2P
List Model No.	N/A
Description of Model differentiation	N/A
Rating(s)	Input: 5V⎓30mA
Product Type	☐ Mobile ☒ Portable ☐ Fix Location
Test Sample No.	-1/2(Normal Sample), -2/2(Engineering Sample)
Hardware Version	V1.1
Software Version	V1.3
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.5 Technical Information of E.U.T.

Network and Wireless Connectivity	Bluetooth (BDR+EDR)

The requirement for the following technical information of the EUT was tested in this report:

Technology	**Bluetooth**
Operation Mode	☒ BDR ☒ EDR ☐ BLE
Modulation Type	GFSK, π/4DQPSK, 8DPSK
Operating Frequency	2402-2480MHz
Transfer Rate	DH5: 1 Mbps 2DH5: 2 Mbps 3DH5: 3 Mbps
Number of Channel	79
Antenna Type	Ceramic Antenna
Antenna Gain(Peak)	-3.31 dBi
Antenna Impedance	50Ω
Rated output Power	0.02 mW/MHz
Remark	The above information are declared by the applicant, EU-LAB is not responsible for the information accuracy provided by the applicant.

All channels were listed on the following table:

Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)
00	**2402**	21	2423	42	2444	63	2465
01	2403	22	2424	43	2445	64	2466
02	2404	23	2425	44	2446	65	2467
03	2405	24	2426	45	2447	66	2468
04	2406	25	2427	46	2448	67	2469
05	2407	26	2428	47	2449	68	2470
06	2408	27	2429	48	2450	69	2471
07	2409	28	2430	49	2451	70	2472
08	2410	29	2431	50	2452	71	2473
09	2411	30	2432	51	2453	72	2474
10	2412	31	2433	52	2454	73	2475
11	2413	32	2434	53	2455	74	2476
12	2414	33	2435	54	2456	75	2477
13	2415	34	2436	55	2457	76	2478
14	2416	35	2437	56	2458	77	2479
15	2417	36	2438	57	2459	**78**	**2480**
16	2418	37	2439	58	2460	-	-
17	2419	38	2440	59	2461	-	-
18	2420	**39**	**2441**	60	2462	-	-
19	2421	40	2442	61	2463	-	-
20	2422	41	2443	62	2464	-	-

Address: 1/F, Bldg. B1, Fuqiao Fourth Industrial Area, Fuhai Street, Baoan District, Shenzhen, Guangdong, China
Website: www.eu-test.com
Tel: (86)-755-2357-5384 Email: Service@eu-test.com

3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

No.	Identity	Document Title
1	MIC Notice No.88 Appendix No.43 Ordinance of MPT No.37, 1981: Article 2 paragraph 1 item (19)	Low power data communications system in the 2.4GHz band

Remark:
Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission should be checked to ensure compliance has been maintained.

3.2 Test Verdict

No.	Description	Test Mode	Data Rate (Mbps)	Verdict	Remark
1	Frequency Tolerance	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Pass	--
2	Occupied Bandwidth	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Pass	--
3	Spread-spectrum Bandwidth / Factor	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Only for reported	--
4	Antenna power	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Pass	--
5	Dwell Time	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Pass	--
6	Spurious Emission Intensity	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Pass	--
7	Secondary Radiated Emission	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Pass	--
8	Spurious Emissions	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Pass	--
9	Interference prevention function	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Pass	--
10	Transmission Radiated Angle Width (3dB Beam Bandwidth)	GFSK, π/4-DQPSK, 8DPSK	1/2/3	N/A	Note 2
11	Construction Protection Confirmation	GFSK, π/4-DQPSK, 8DPSK	1/2/3	Compliance	--

Note 1: The tests were performed according to the method of measurements prescribed in MIC Notice No.88 Appendix No.43.
Note 2: It is unnecessary to testing, when a E.I.R.P. is less than the variable E.I.R.P. limit of minimum (DSSS: 12.14dBm/MHz) or less, FHSS (2427-2470.75 MHz): 6.91dBm/MHz or less, etc.)

3.3 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China

4 Test Configuration

4.1 Test Environment

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	55 %	
Atmospheric Pressure	101 kPa	
Temperature	NT (Normal Temperature)	23℃
Working Voltage of the EUT	NV (Normal Voltage)	5.0VDC
	LV (Low Voltage)	4.5VDC
	HV (High Voltage)	5.5VDC

Power Supply Voltage Fluctuation Test

Voltage Fluctuation Test	Normal Voltage	High Voltage +10% of Normal Voltage	Low Voltage -10% of Normal Voltage
Input To EUT	5.0VDC	5.5VDC	4.5VDC
Output To RF Module	3.3VDC	3.3VDC	3.3VDC
Voltage Variation (%)	--	0.00%	0.00%

Note:

Voltage Variation (%)=(Output high or Low Voltage - Output Normal Voltage)/ Output Normal Voltage* 100%

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.

4.2 Test Equipment

Radiated Emission and RF Test					
Equipment	**Manufacturer**	**Model No**	**Serial No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2025/01/08	2026/01/07
Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	EE-007	2023/01/14	2026/01/13
Double Ridged Horn Antenna	A-INFOMW	LB-10180-NF	EE-008	2023/01/12	2026/01/11
Pre-amplifier	Agilent	8447D	EE-009	2025/01/08	2026/01/07
Pre-amplifier	Agilent	8449B	EE-010	2025/01/08	2026/01/07
MXA Signal Analyzer	Agilent	N9020A	EE-011	2025/01/08	2026/01/07
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2025/01/08	2026/01/07
Test Software	Farad	EZ-EMC	EE-015	N.C.R	N.C.R
MIMO Power Measurement Module	TSTPASS	TSPS 2023R	EE-016	2025/01/08	2026/01/07
RF Test Software	TSTPASS	TS32893 V2.0	EE-017	N.C.R	N.C.R
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	EE-402	2025/02/14	2026/02/13
Loop Antenna	TESEQ	HLA6121	EE-403	2025/02/14	2026/02/13
MXG RF Analog Signal Generator	Agilent	N5181A	EE-406	2025/02/14	2026/02/13
Constant Temperature Humidity Chamber	Guangxin	GXP-401	ES-002	2024/07/30	2025/07/29
Power Sensor	ROHDE&SCHWARZN	NRP18S	ES-052	2025/02/14	2026/02/13
DC Power Source	QJE	QJ3020E	ES-037	2024/7/30	2025/7/29

Note[1]: Calibration Company: Shenzhen Academy Of Metrology& Quality inspection.
Note[2]: Calibration method: Calibration conducted in foreign countries, which is equivalent to calibration conducted by the NICT or a designated calibration agency under Article 102-18-1 and Article 24-2, Paragraph 4 of the Radio Act.

4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Lenovo Notebook	Lenovo	Xiaoxin Air 14ALC 2021	EMC-PJ-052
2	Storm A2 Wireless Gaming Headset	Shenzhen Rango Innovation Technology co., Ltd.	StormA2	--

4.4 Measurement Uncertainty

Parameters	Uncertainty
Frequency Error / 99% Bandwidth	(3.2 x f x 10^{-6}) Hz
Antenna Power	1.82 dB
TX-RX Spurious Emissions	1.84 dB
Transmission Antenna Gain	5.36 dB
Temperature	0.82 ℃
Humidity	4.1%
DC / AC Power Source	0.04%
Time of Occupancy (Dwell Time)	1.8 %
Noet: “f” is the nominal signal frequency in Hz.	

Note: This uncertainty represents as expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

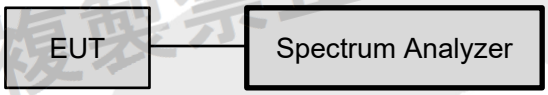
5 Test Items

5.1 Frequency Tolerance Test

5.1.1 Test Requirement

Item	Limits
Frequency Tolerance	≤±50 ppm

5.1.2 Test Setup Diagram



5.1.3 Test Procedure

1. Test Frequency= test channel
   RBW=VBW=10KHz
   Span=1MHz
   Sweep time=Auto
   Detector mode=Positive peak
   Indication mode=Max hold
2. EUT have transmitted unmodulated signal and fixed channelize. f is using the mark cursor to mark the peak frequency value, fc is declaring of channel frequency.

5.1.4 Test Deviation

There is no deviation with the original standard.

5.1.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, carrier mode.

5.1.6 Test Data

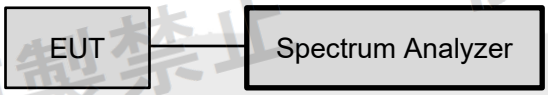
PASS.
Please refer to Annex D for details.

5.2 Occupied Bandwidth and Spread-spectrum Bandwidth / Factor

5.2.1 Test Requirement

Item	Limits
Occupied Band Width	FHSS≦83.5MHz; OFDM≦40MHz, DSSS≦26MHz; Others≦26MHz

5.2.2 Test Setup Diagram



5.2.3 Test Procedure

1. Set the spectrum analyzer as follows:
   Center frequency: Test frequency
   Span: Approximately 2 to 3.5 times nominal bandwidth
   Resolution bandwidth: Within 3% of the technical standard
   Video bandwidth: equivalent to resoluble bandwidth
   Sweep time: auto
   Sweep mode: Continuous sweep
   Detection: Positive peak
   Trace mode: Maximum hold
2. After repeating sweeps until the display shows steady data, store the values at all data points into the computer array variables.
3. Convert the dB values at all data points to antilogarithm on the power dimension.
4. Obtain sum total of the power at all data points, and store it as “total power”.
5. Accumulate the power at each data point sequentially upward from the lowest frequency and obtain the limit data point where the accumulated power becomes 0.5% (5% for spreading bandwidth) of the “total power”. Then convert the limit data point into frequency and store it as “lower limit frequency”
6. Accumulate the power at each data point sequentially downward form the highest frequency and obtain the limit data point where the accumulated power becomes 0.5% (5% for spreading bandwidth) of the “total power”. Then convert the limit data point into frequency and store it as “upper limit frequency”.
7. Spread Spectrum Factor = Spread Spectrum Bandwidth / modulation rate of EUT.

5.2.4 Test Deviation

There is no deviation with the original standard.

5.2.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

5.2.6 Test Data

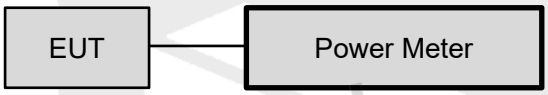
PASS.
Please refer to Annex D for details.

5.3 Antenna Power Test

5.3.1 Test Requirement

Item	Limits
Antenna Power Density	a) FH, FH+DS, or FH+OFDM form 2427 - 2470.75 MHz: ≦3 mW/MHz b) DS but other than a) from 2400~2483.5 MHz: ≦10 mW/MHz c) OFDM, but other than a): For OCB of 26MHz or less: ≦10 mW/MHz For OCB of over 26 MHz to 40 MHz: ≦5 mw/MHz d) Other than a), b) and c): ≦10 mW
Antenna Power Error	+20% (Base on manufacturer declare antenna power density)
EIRP Power	6.91 dBm/MHz

5.3.2 Test Setup Diagram



5.3.3 Test Procedure

1. Measure the total power by the Power Meter in a state of hopping mode.
2. Calculate the mean power per 1MHz by dividing the reading level by spread bandwidth.

Output power Density (mW/MHz) = Total power (mW) / spread bandwidth (MHz)

5.3.4 Test Deviation

There is no deviation with the original standard.

5.3.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

5.3.6 Test Data

PASS.

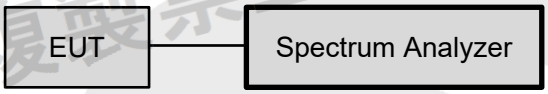
Please refer to Annex D for details.

5.4 Dwell Time

5.4.1 Test Requirement

Item	Limits
Dwell Time	For the radio equipment that uses the frequency hopping method excluding a combination of the spread spectrum method and OFDM, the total sum of the frequency retention time in any frequency within the time obtained by multiplying the diffusion rate by 0.4 second shall be 0.4 second or shorter

5.4.2 Test Setup Diagram



5.4.3 Test Procedure

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	0 MHz
RB	1 MHz
VB	1 MHz
Detector	Peak
Trace	Max Hold
Sweep	Continuous

a. The transmitter output (antenna port) was connected to the spectrum analyzer.
b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span tozero span.
f Measure the maximum time duration of one single pulse
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse
i. Dwell time = [spreading rate/79 x duty-cycle x 0.4 seconds. (to be determined for each mode DH1. DH3, DH5)

5.4.4 Test Deviation

There is no deviation with the original standard.

5.4.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

5.4.6 Test Data

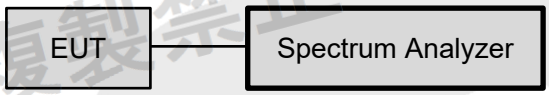
PASS.
Please refer to Annex D for details.

5.5 Spurious Emissions Intensity Test

5.5.1 Test Requirement

Item	Limits
TX Spurious Emission	≦2.5μW (2387MHz>f ; 2496.5MHz<f)
	≦25μW (2387MHz≦f<2400MHz) and (2483.5MHz<f≦2496.5MHz)

5.5.2 Test Setup Diagram



5.5.3 Test Procedure

Spectrum Parameter	Setting
Attenuation	Auto
RB	30-1000 MHz: 1 MHz/1 MHz
VB	Above 1GHz: 1 MHz/1 MHz
Detector	Peak
Trace	Max Hold
Sweep	Auto

1. The EUT is placed in transmit mode at maximum power/modulation at a fixed channel.
2. Setting of SA is following as: RBW/VBW = 1MHz; / AT: 10dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
3. Setting of SA is following as 30 MHz and stop frequency 2387 MHz Then to mark peak reading value + cable loss shall be less than 2.5 μW
4. SA adjusted to start frequency 2387 MHz and stop frequency 2400 MHz. Then to mark peak reading value + cable loss shall be less than 25 μW.
5. SA adjusted to start frequency 2483.5 MHz and stop frequency 2496.5 MHz Then to mark peak reading value + cable loss shall be less than 25 μW
6. SA adjusted to start frequency 2496.5 MHz and stop frequency 12500 MHz Then to mark peak reading value + cable loss shall be less than 2.5 μW
7. If the Result_Value is over the requirement, take total sum of 1MHz band centered at the spur frequency like ACLP measurement as Result_Value.

5.5.4 Test Deviation

There is no deviation with the original standard.

5.5.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

5.5.6 Test Data

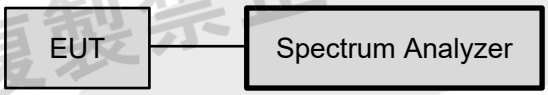
PASS.
Please refer to Annex D for details.

5.6 Secondary Radiated Emissions Test

5.6.1 Test Requirement

Item	Limits
RX Spurious Emission	≦4nW (f<1GHz)
	≦20nW (1GHz≦f)

5.6.2 Test Setup Diagram



5.6.3 Test Procedure

Spectrum Parameter	Setting
Attenuation	Auto
RB	30-1000 MHz: 100KHz/100KHz
VB	Above 1GHz: 1 MHz/1 MHz
Detector	Peak
Trace	Max Hold
Sweep	Auto

1. The EUT is placed in Rx mode and set to a fixed channel.
2. Setting of SA is following as RB / VB: 100 kHz (below 1GHz emissions) / 1 MHz (above 1GHz emissions) / AT:10 dB / Ref: 0dBm / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
3. SA set RB: 100 kHz and VB: 100 kHz. Then adjust to start frequency 30 MHz and stop frequency 1000 MHz. Search to mark peak reading value + cable loss shall be less than 4 nW
4. SA set RB: 1 MHz and VB: 1 MHz. Then adjust to start frequency 1000 MHz and stop frequency 12500 MHz. Search to mark peak reading value + cable loss shall be less than 20 nW
5. If power level of lower emissions are more than 1/10 of limit (0.4nW for f < 1 GHz, 2 nW for f≥ 1GHz), all those are to be indicated in the 2nd and 3rd lines. If others are 1/10 or less more of the limit, no necessary to be indicated

5.6.4 Test Deviation

There is no deviation with the original standard.

5.6.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

5.6.6 Test Data

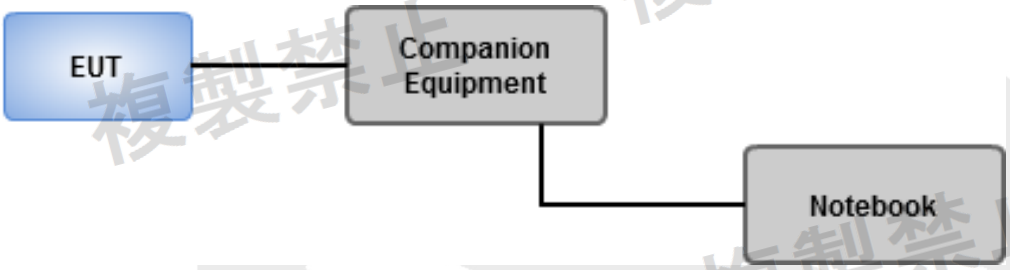
PASS.
Please refer to Annex D for details.

5.7 Interference Prevention Function

5.7.1 Test Requirement

Item	Limits
Identification	≥ 48 bits

5.7.2 Test Setup Diagram



5.7.3 Test Procedure

1. In the case that the EUT has the function of automatically transmitting the identification code:
   a. Transmit the predetermined identification codes form EUT.
   b. Check the transmitted identification codes with the demodulator.
2 .In the case of receiving the identification code:
   a. Transmit the predetermined identification codes form the counterpart.
   b. Check if communication is normal.
   c. Transmit the signals other than predetermined ID codes form the counterpart.
   d. check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

5.7.4 Test Deviation

There is no deviation with the original standard.

5.7.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

5.7.6 Test Data

PASS.

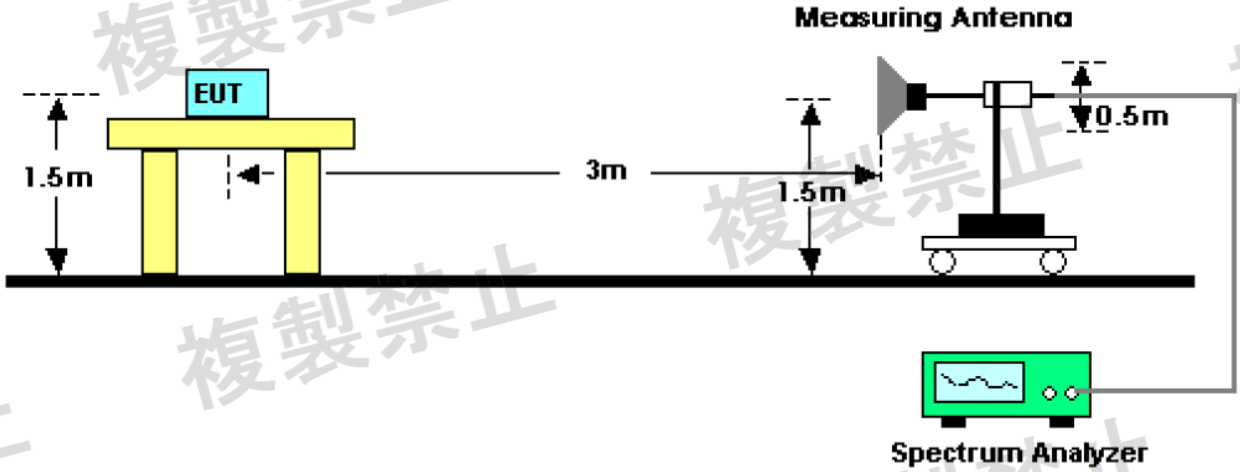
Mode	ID Code	Test Results
BT	13:A4:54:37:F1:18	Pass

5.8 Transmission Radiation Angle Width (3dB Beamwidth) Measurement

5.8.1 Test Requirement

Item	Limits
3dB antenna beam width	360/A (If A<1; then A=1) A = {EIRP Power [mW] / 16.36 for DS, OFDM} or A = {EIRP Power [mW] / 4.9 for FH}
Note: This test item will not be applied to the transmission antenna which has a gain of 2.14dBi or less.	

5.8.2 Test Setup Diagram



5.8.3 Test Procedure

1. Set EUT and measuring antenna at the same height and roughly facing each other.
2. Set spectrum analyzer with RBW=1 MHz, VBW=1 KHz, Y scale=5 dB, Detector=Peak, Trace mode=Max Hold, and tune reference level to observe receiving signal position.
3. Rotate directions of the EUT horizontally and vertically to find the maximum receiving power.
4. Move the measuring antenna height up and down within ± 50cm of EUT height and swing it to find the maximum output of measuring antenna. The output level at the spectrum analyzer is read as “E”
5. Calculate permitted radiation angle in horizontal and vertical using EIRP measured in another test method.
6. Calculate 3dB antenna beam width by the formula below 360/A (If A<1; then A=1). A = {EIRP Power [mW] / 16.36 for DS, OFDM} or A = {EIRP Power [mW] / 4.9 for FH}

5.8.4 Test Deviation

There is no deviation with the original standard.

5.8.5 EUT Operation during Test

The EUT was programmed to be in continuous transmit, channel-hopping mode.

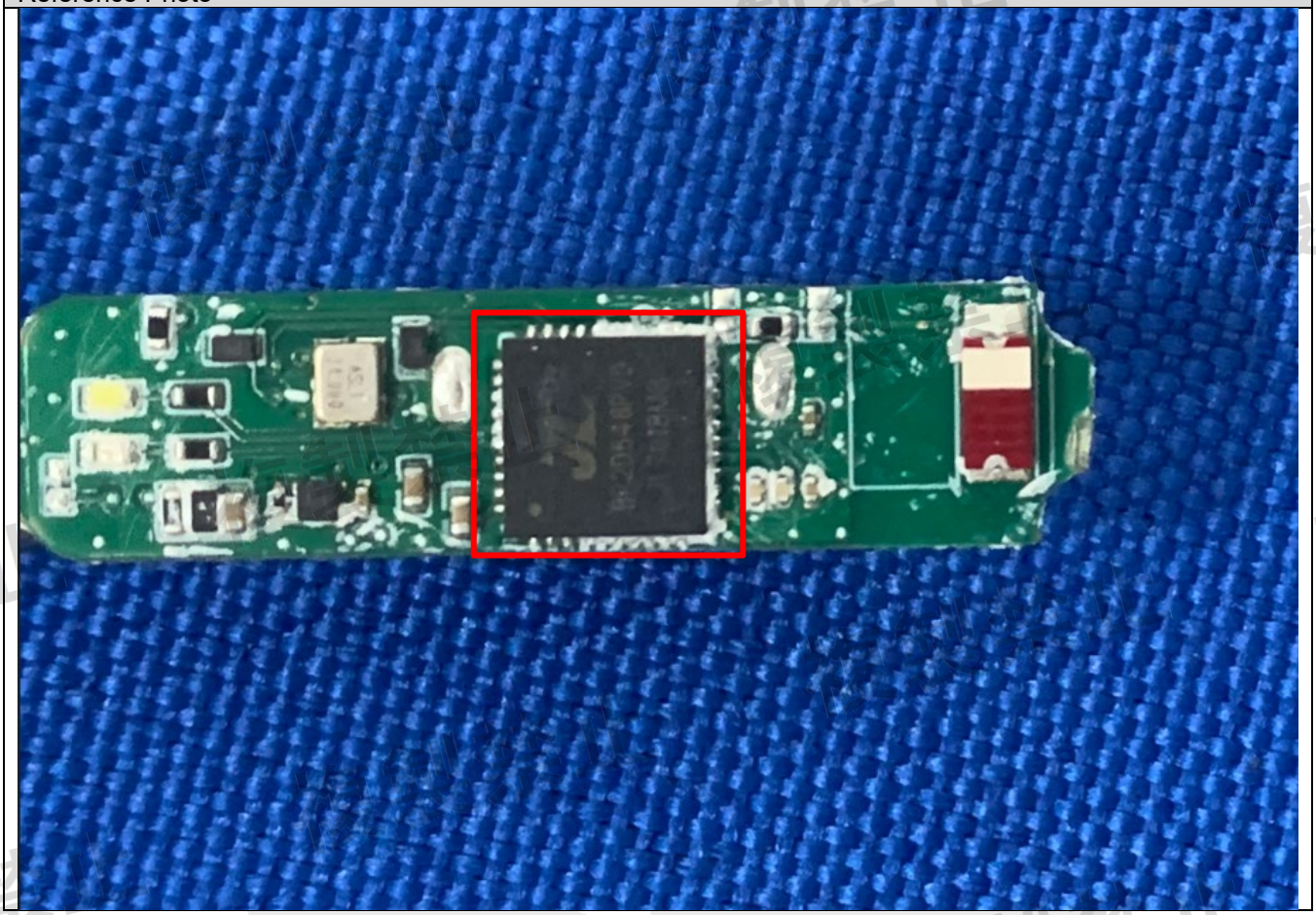
5.8.6 Test Data

Note: Because the EIRP is less than 6.91dBm/MHz, this item is not applicable.

5.9 Construction Protection Confirmation Method

The RF and modulation portions are protected against illegal modification as following method:

Protected Method	Description
Structure protection	The terminal number is 40, terminal pitch is 1mm. it can't be easily opened and modified.
Reference Photo	



ANNEX A TEST SETUP PHOTOS

Please refer to the document “8328EU012613W-AA.PDF”

ANNEX B EXTERNAL PHOTOS

Please refer to the document “8328EU012613W-AB.PDF”

ANNEX C INTERNAL PHOTOS

Please refer to the document “8328EU012613W-AC.PDF”

ANNEX D TEST DATA

Please refer to the document “8328EU012613W-AD.PDF”

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--- End of Report ---

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