



Fangguang Inspection & Testing Co., Ltd.



MEASUREMENT REPORT

FCC PART 15.247 Zigbee

Report No.: S2025042443600101

Issue Date: 06-09-2025

Applicant: Jiangsu Shushi Technology Co., Ltd.
Address: NO.9 Nanxu Road, RunZhou District, Zhenjiang, Jiangsu, China
FCC ID: 2BAGQ-3RSH06027BWZ
Product: Smart Hub WZ3
Model No.: 3RSH06027BWZ
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (15.247)
Test Procedure(s): ANSI C63.10-2013, KDB 558074 D01v05r02
Result: Pass
Item Receipt Date: Apr. 24, 2025
Test Date: Apr. 25 ~ May. 27, 2025

Compiled By

Stone Zhang

(Stone Zhang)
Senior Test Engineer

Approved By

Line Chen

(Line Chen)
Engineer Manager



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s). The test report shall not be reproduced except in full without the written approval of Fangguang Inspection & Testing Co., Ltd. Wuxi Branch.

The test report must not be used by the client to claim product certifications, approval, or endorsement by NVLAP, NIST or any agency of U.S. Government.

Revision History

Report No.	Version	Description	Issue Date
S2025042443600101	Rev. 01	/	06-09-2025

CONTENTS

Description	Page
§2.1033 General Information	5
1. INTRODUCTION	6
1.1. Scope	6
1.2. Fangguang Test Location	6
2. PRODUCT INFORMATION	7
2.1. Equipment Description	7
2.2. Product Specification Subjective to this Report	7
2.3. Operation Frequency / Channel List	8
2.4. Device Capabilities	8
2.5. Description of Test Software	10
2.6. Test Mode	11
2.7. Test Configuration	11
2.8. EMI Suppression Device(s)/Modifications	11
2.9. EUT Photo	11
2.10. Labeling Requirements	11
2.11. Calculation with all conversion and correction factors used	11
3. DESCRIPTION OF TEST	12
3.1. Evaluation Procedure	12
3.2. AC Line Conducted Emissions	12
3.3. Radiated Emissions	13
4. ANTENNA REQUIREMENTS	14
5. TEST EQUIPMENT CALIBRATION DATE	15
6. MEASUREMENT UNCERTAINTY	17
7. TEST RESULT	18
7.1. Summary	18
7.2. 6dB Bandwidth Measurement	19
7.2.1. Test Limit	19
7.2.2. Test Procedure used	19
7.2.3. Test Setting	19
7.2.4. Test Setup	19
7.2.5. Test Result	20
7.3. Output Power Measurement	22

7.3.1.	Test Limit	22
7.3.2.	Test Procedure Used	22
7.3.3.	Test Setting	22
7.3.4.	Test Setup	23
7.3.5.	Test Result	23
7.4.	Power Spectral Density Measurement	26
7.4.1.	Test Limit	26
7.4.2.	Test Procedure Used	26
7.4.3.	Test Setting	26
7.4.4.	Test Setup	27
7.4.5.	Test Result	28
7.5.	Conducted Band Edge and Out-of-Band Emissions	31
7.5.1.	Test Limit	31
7.5.2.	Test Procedure Used	31
7.5.3.	Test Setting	31
7.5.4.	Test Setup	31
7.5.5.	Test Result	32
7.6.	Radiated Spurious Emission Measurement	41
7.6.1.	Test Limit	41
7.6.2.	Test Procedure Used	41
7.6.3.	Test Setting	41
7.6.4.	Test Setup	43
7.6.5.	Test Result	45
7.7.	Radiated Restricted Band Edge Measurement	63
7.7.1.	Test Limit	63
7.7.2.	Test Procedure Used	64
7.7.3.	Test Setting	64
7.7.4.	Test Setup	65
7.7.5.	Test Result	66
7.8.	AC Conducted Emissions Measurement	72
7.8.1.	Test Limit	72
7.8.2.	Test Setup	72
7.8.3.	Test Result	73
8.	CONCLUSION	75

§2.1033 General Information

Applicant:	Jiangsu Shushi Technology Co., Ltd.
Applicant Address:	NO.9 Nanxu Road, RunZhou District, Zhenjiang, Jiangsu, China
Manufacturer:	Jiangsu Shushi Technology Co., Ltd.
Manufacturer Address:	NO.9 Nanxu Road, RunZhou District, Zhenjiang, Jiangsu, China
Factory:	Shushi (Zhenjiang) Intelligent Technology Co., Ltd.
Factory Address:	NO.9 Nanxu Road, RunZhou District, Zhenjiang, Jiangsu, China
Test Site:	Fangguang Inspection & Testing Co., Ltd.
LAB ID:	CN5037
Test Site Address:	No.8 Ningyun Rd., Xinwu District Wuxi, Jiangsu 214000 China
FCC Rule Part(s):	Part 15 Subpart C (15.247)
FCC ID:	2BAGQ-3RSH06027BWZ
Test Device Serial No.:	S/N.: / <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
FCC Classification:	Digital Transmission System (DTS)

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2. Fangguang Test Location

These measurement tests were performed at the Fangguang Inspection and testing Co.,LTD located at No.8 Ningyun Rd., Xinwu District Wuxi, Jiangsu 214000 China. The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.10-2014.

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	Smart Hub WZ3
Test Model:	3RSH06027BWZ
Trade Mark:	 THIRD REALITY
Input Voltage Range:	AC 120V 60Hz
Software Version:	03.00.62.00
Hardware Version:	REV0.5
EUT sample number:	S20250424436001-1-1/-1-2

Note: This information is provided by the Customer and its authenticity is the responsibility of the Customer.

2.2. Product Specification Subjective to this Report

Operating Band	2405~2480MHz
Number of Channels	16
Channel Spacing	5 MHz
Type of modulation	O-QPSK
Antenna Type:	PCB Antenna
Antenna Gain:	2.0dBi

Note: The maximum Antenna Gain was declared by the manufacturer.

2.3. Operation Frequency / Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405 MHz	12	2410 MHz	13	2415 MHz
14	2420 MHz	15	2425 MHz	16	2430 MHz
17	2435 MHz	18	2440 MHz	19	2445 MHz
20	2450 MHz	21	2455 MHz	22	2460 MHz
23	2465 MHz	24	2470 MHz	25	2475 MHz
26	2480 MHz	--	--	--	--

EUT was tested with Channel 11, 18, 25 and 26.

2.4. Device Capabilities

This device contains the following capabilities: Zigbee.

Note: The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW =8MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles of Zigbee are 53.50%.

Test Mode	Antenna	Frequency (MHz)	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
Zigbee	Ant1	2405	1.07	2.00	53.50
		2440	1.07	2.00	53.50
		2475	1.07	2.00	53.50
		2480	1.06	2.00	53.00





2.5. Description of Test Software

The test utility software used during testing was “BLDevCube.exe”, Power Parameter Value:

Test Mode	Channel	ANT1
Zigbee	2402	14
	2440	14
	2475	14
	2480	10

2.6. Test Mode

Test Mode	Mode 1: Transmit by Zigbee
-----------	----------------------------

2.7. Test Configuration

The EUT was tested per the guidance of KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.8. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.9. EUT Photo

The EUT external photo, internal photo and test setup photo, please refer to the plots in the S20250424436001-A1/A2/A3.

2.10. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

2.11. Calculation with all conversion and correction factors used

For AC Line Conducted Emissions Test:

Measure Level (dB μ V) = Reading Level (dB μ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

For Radiated Emissions Below 1GHz Test:

Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

For Radiated Emissions Above 1GHz Test:

Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01 v05r02 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. The turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-25GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- Use a unique coupling to the intentional radiator.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	FWXGJC-2016-181	1 year	2025/07/22
Two-Line V-Network	R&S	ENV 216	FWXGJC-2016-182	1 year	2025/07/23
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-385	1 year	2025/09/03

Radiated Emission

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Loop Antenna	Schwarzbeck	FMZB 1519B	FWXGJC-2018-015	1 year	2025/07/23
Bi-Log Antenna	R&S	VULB 9168	FGZZ-2024-036	1 year	2025/08/03
Broadband Horn Antenna	R&S	HF907	FWXGJC-2016-267-07	1 year	2025/07/26
Broadband Horn Antenna	Schwarzbeck	BBHA9170	FWXGJC-2018-016	1 year	2025/07/26
EMI Receiver	R&S	ESCI3	FGZZ-2024-033	1 year	2025/07/18
EXA Signal Analyzer	Keysight	N9020A	FWXGJC-2025-006	1 year	2025/07/14
EXA Signal Analyzer	Keysight	N9010B	FWXGJC-2018-010	1 year	2025/07/14
Pre-Amplifier	Tonscend	TAP0118048	FGZZ-2024-037	1 year	2025/08/19
Pre-Amplifier	Chengyi	EMC184055SE	FWXGJC-2018-018	1 year	2025/07/23
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-387	1 year	2025/09/03
Anechoic Chamber	SAEMC	FSAC318	FWXGJC-2024-035	3 year	2027/06/02

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Keysight	N9010B	FWXGJC-2018-010	1 year	2025/07/15
RF Control Unit	Tonscend	JS0806-2	FWXGJC-2018-013	1 year	2025/05/19
Thermohygrometer	Yuhuaze	HTC-1	FWXDA-2016-385	1 year	2025/09/03

Test Software	Manufacturer	Version	Asset No.	Function
JS1120-3 Test System	tonscend	V3.3.10	/	Conducted Test
JS32	tonscend	V5.0.0	/	Radiated Emission
EMI Test Software	R&S	9.26.00	/	Conducted Emission

Auxiliary Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Filter	Tonscend	ZBSF6	07247867	1 year	2025/07/26
Filter	Tonscend	ZHPF6	07233297	1 year	2025/07/26
Attenuator	Tonscend	10dB	/	1 year	2025/07/26
RF Cable	Tonscend	T-1	/	1 year	2025/07/26

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 2.68dB
Radiated Emission Measurement (9kHz - 30MHz)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 3.06dB
Radiated Emission Measurement (30MHz -1GHz)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.01dB
Radiated Emission Measurement (1-18GHz)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.97dB
Radiated Emission Measurement (18-40GHz)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 5.32dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 30MHz-1GHz: 1.00 dB 1GHz-12.75GHz: 1.30 dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.60dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.80dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.20MHz
Frequency Stability
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.1×10^{-6} MHz

7. TEST RESULT

7.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	$\geq 500\text{kHz}$	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	$\leq 30\text{dBm}$		Pass	Section 7.3
15.247(e)	Power Spectral Density	$\leq 8\text{dBm/3kHz}$		Pass	Section 7.4
15.247(d)	Band Edge	$\geq 20\text{dBc}$		Pass	Section 7.5
15.247(d)	Out-of-Band Emissions	$\geq 20\text{dBc}$		Pass	Section 7.5
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.6&7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

Notes:

- 1) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. 6dB Bandwidth Measurement

7.2.1. Test Limit

The minimum permissible 6dB bandwidth is 500 kHz.

7.2.2. Test Procedure used

ANSI C63.10-2013 Section 11.8.2 Option 1

KDB 558074 D01 v05r02 – Section 8.2

7.2.3. Test Setting

1. Set RBW = 100 kHz
2. VBW $\geq 3 \times$ RBW
3. Detector = peak
4. Trace mode = max hold
5. Sweep = auto couple
6. Allow the trace was allowed to stabilize
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.2.4. Test Setup

