TEST REPORT

Applicant:	HALEMEIER GmbH
Address of Applicant:	Lange Strasse 51 49326 Melle, Neuenkirchen, Germany
Manufacturer:	HALEMEIER GmbH
Address of Manufacturer:	Lange Strasse 51 49326 Melle, Neuenkirchen, Germany

Equipment Under Test (EUT)

Product Name:	Smart sender
Model No.:	HA-ZSM-MW^2 , SR-ZG9001K17-CCT, 31.122.01, 31.122.02, 31.122.03, 31.122.04, 3112201, 3112202, 3112203, 3112204
Applicable standards:	Article 2 paragraph 1 item(19) MIC Notice No.88 Annex 1 MIC Notice No.88 Annex 43
Date of sample receipt:	October 16, 2025
Date of Test:	October 17, 2025-November 04, 2025
Date of report issued:	April 30, 2026
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

深圳市环球众一科技有限公司 Global United Technology Services Co., Ltd. 检验检测专用章 Inspection&Testing Services

Robinson Luo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*April 30, 2026*	*Original*

Tested By: ***Date:*** *April 30, 2026*

Test Engineer

Prepared By: ***Date:*** *April 30, 2026*

Project Engineer

Check By: ***Date:*** *April 30, 2026*

Reviewer

3 Contents

Page

1 COVER PAGE 1

2 VERSION 2

3 CONTENTS 3

4 TEST SUMMARY 4

5 GENERAL INFORMATION 5

5.1 GENERAL DESCRIPTION OF EUT 5
5.2 TEST MODE 7
5.3 TEST CONDITION 7
5.4 TEST FACILITY 7
5.5 TEST LOCATION 7
5.6 OTHER INFORMATION REQUESTED BY THE CUSTOMER 7
5.7 DESCRIPTION OF SUPPORT UNITS 7
5.8 TEST INSTRUMENTS LIST 8
5.9 MEASUREMENT UNCERTAINTY 8

6 TEST RESULTS AND MEASUREMENT DATA 9

6.1 FREQUENCY ERROR 9
6.2 ANTENNA POWER 10
6.3 OCCUPY BANDWIDTH (99%) 11
6.4 SPURIOUS EMISSION INTENSITY 12
6.5 LIMIT OF SECONDARY RADIATED EMISSIONS 13
6.6 INTERFERENCE SUPPRESSION 14

7 TEST SETUP PHOTO 15

8 EUT CONSTRUCTIONAL DETAILS 15

4 Test Summary

Test Item	Test Requirement	Result
RF shielding method	Article 2 paragraph 1 item(19)	Pass
Frequency Error	Article 2 paragraph 1 item(19)	Pass
Antenna Power	Article 2 paragraph 1 item(19)	Pass
99% Occupied bandwidth	Article 2 paragraph 1 item(19)	Pass
Spurious Emissions Intensity	Article 2 paragraph 1 item(19)	Pass
Limit of secondary radiated emissions	Article 2 paragraph 1 item(19)	Pass
Interference suppression	Article 2 paragraph 1 item(19)	Pass
Transmission Antenna Gain	Article 2 paragraph 1 item(19)	N/A
Transmission Radiation Angle Width(3dB Beam width)	Article 2 paragraph 1 item(19)	N/A

Remarks

1. *Pass: The EUT complies with the carrier sense capability and radio interference prevention capability.*
2. *N/A: Not applicable due to the antenna gain is less than 2.14dBi.*

複製禁止

5 General Information

5.1 General Description of EUT

Product Name:	Smart sender
Model No.:	HA-ZSM-MW^2 , SR-ZG9001K17-CCT, 31.122.01, 31.122.02, 31.122.03, 31.122.04, 3112201, 3112202, 3112203, 3112204
Test Model No.:	HA-ZSM-MW^2
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits The difference is model name for commercial purpose.	
Operation Frequency:	2405MHz~2480MHz
Channel numbers:	16
Channel separation:	5MHz
Modulation technology:	O-QPSK
Antenna Specification:	PCB Antenna
Antenna Gain:	1.23dBi
Power supply:	DC 3V(2*1.5V, SIZE"AAA" battery)

Disclaimer statement:

1. Antenna gain information provided by the customer, and the laboratory is not responsible for its authenticity.
2. The information in this section is provided by the applicant or manufacturer, GTS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

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

Final test channel as follow:					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	19	2445	26	2480

5.2 Test mode

Software is used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

5.3 Test condition

Power Supply:	Battery:	DC 3.0V
	The RF unit is supplied by DC 3.3V. The fluctuation of input voltage to the circuit of RF unit of test equipment is under ±1%, when input voltage from DC 3.0V to the test equipment is fluctuated by ±10%, So, all measurement has been conducted by only rated voltage.	
	The measurement result of the voltage fluctuation at RF circuit when DC 3.89V +/- 10%.	
	Power supply voltage	DC 3.3V @ RF circuit
	2.7V	3.31V
	3.0V	3.31V
	3.33V	3.31V

Remark: Both normal and extremely condition were tested, only show the worst case.

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC—Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files.

● **ISED —Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 123-128, Tower AS, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: +86-0755-27798480
Fax: +86-0755-27798960

5.6 Other Information Requested by the Customer

None.

5.7 Description of Support Units

None.

5.8 Test Instruments list

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	Apr. 11, 2025	Apr. 10, 2026
2	EMI Test Receiver	R&S	ESCI 7	GTS552	Apr. 12, 2025	Apr. 11, 2026
3	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	Apr. 11, 2025	Apr. 10, 2026
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	Apr. 11, 2025	Apr. 10, 2026
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	Apr. 11, 2025	Apr. 10, 2026
6	Wideband Power Meter	Keysighte	N1924A	GTS673	Apr. 11, 2025	Apr. 10, 2026
7	USB RF Power Sensor	DARE	RPR3006W	GTS569	Apr. 11, 2025	Apr. 10, 2026
8	RF Switch Box	Shongyi	RFSW3003328	GTS571	Apr. 11, 2025	Apr. 10, 2026
9	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	Apr. 11, 2025	Apr. 10, 2026
10	Thermo meter	JINCHUANG	GSP-8A	GTS641	Apr. 15, 2025	Apr. 14, 2026
11	EXA Signal Analyzer	Keysight	N9010B	MY60241168	Nov. 02, 2024	Nov. 01, 2025
12	Bluetooth Test Set	Anritsu	MT8852B	SN6262097212	Oct. 08, 2025	Oct. 07, 2026
13	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	Jul. 01, 2025	Jun. 30, 2026
14	Attenuator	N/A	10DB	GTS669	Apr. 11, 2025	Apr. 10, 2026
All above equipments were calibrated by Guangzhou LiSai Metrology & Test Co.,Ltd.. Technical basis for calibration: JJF 1076-2020, JJF 1101-2019, JJF 1144-2006, JJF 1396-2013, JJF 1885-2020, JJF 1931-2021, GJB 2650-1996.						

Calibration Information (Article24-2,Paragraph 4 of the Radio Act)	
☐	a) Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18-1 of the Radio Act
☐	(b) Calibration conducted based on the regulations of Article 135 or 144 of the Measurement Act
☑	(C) Calibration conducted in foreign countries, which is equivalent to calibration conducted by the NICT or a designated calibration agency under Article 102-18-1 of the Radio Act
☐	(d)Calibration,etc.conducted by using measuring instruments and other facilities listed at the bottom of appended table 3 of the Radio Act, which is to have been calibrated as described in (a) through (c) above

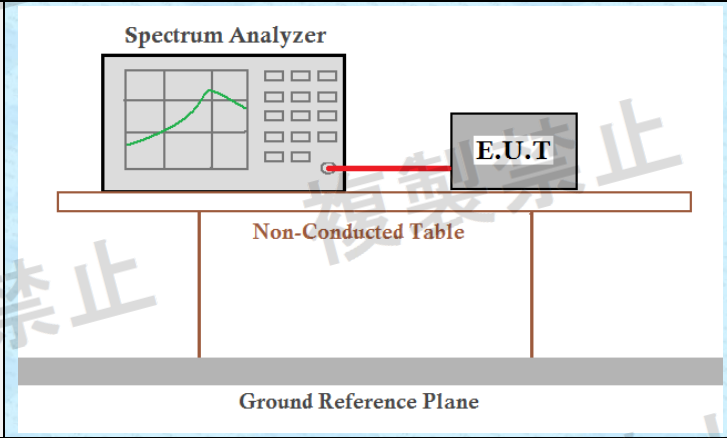
5.9 Measurement uncertainty

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR100028-1 [2] and shall correspond to an expansion factor (coverage factor) K=1.96 or K=2 (which provide confidence levels of respectively 95% and 95.5% in the case where the distributions characterizing the actual measurement uncertainties are normal.

Parameter	Uncertainty
RF frequency	$+/-6*10^{-7}$
Total RF power, conducted	+/-0.8dB
Spurious emissions, conducted	+/-0.8dB
DC and low frequency voltages	+/-3%
Humidity	+/-5%
Temperature	+/-1˚C

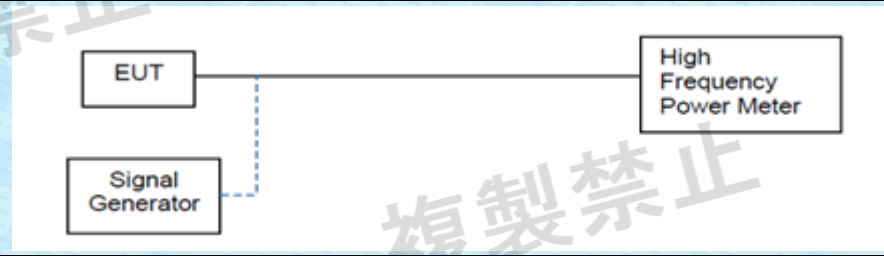
6 Test results and Measurement Data

6.1 Frequency Error

Test condition:	Modulation, continuously transmitting.
Spectrum set:	Test Frequency: test channel, RBW=VBW=100KHz, Span=6MHz, Sweep time=Auto, Detector mode=Positive peak
Limit:	±50ppm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test results:	Pass

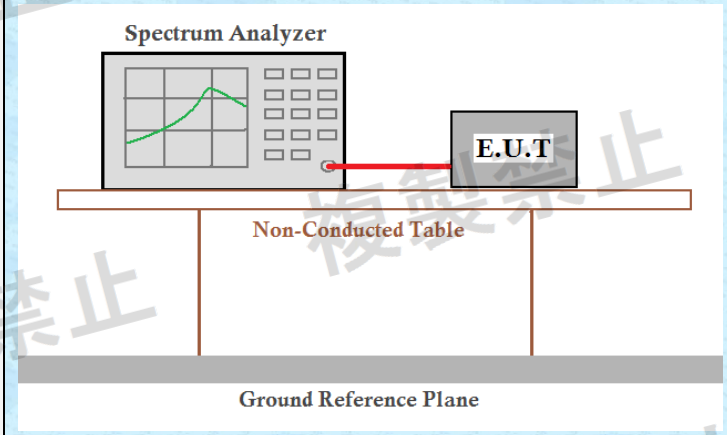
Measurement Data: The detailed test data see Appendix for Zigbee.

6.2 Antenna Power

Test condition:	Test diffusion code and modulate with standard coding test signal
Test Procedure:	a) The EUT is connected to the input port of the high frequency power meter through the attenuator and the transmit frequency is set. b) Remove the EUT and put the replacing signal generator (SG). Set the signal generator (SG) at same frequency and transmit on, the set SG output power at Pt to give the equivalent output level of “E”. c) Calculate antenna power density by the formula below PD=Pt+10*log(1/x). x: The duty cycle of the EUT in continuously transmitting mode Pt: Output power of the SG Antenna power tolerance: +20% No lower limit EIRP=Power+Gain
Limit:	10mW
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test results:	Pass

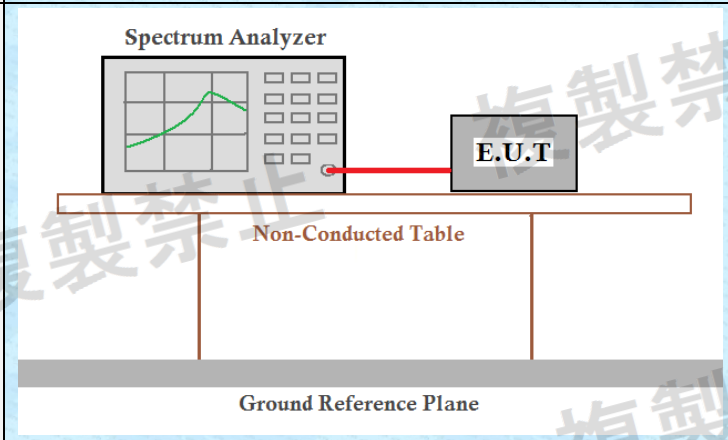
Measurement Data: The detailed test data see Appendix for Zigbee.

6.3 Occupy Bandwidth (99%)

Test condition:	Test diffusion code and modulate with standard coding test signal
Spectrum set:	Test Frequency: test channel, RBW=VBW=30KHz, Span=4MHz, Sweep time=Auto, Detector mode=Positive peak
Limit:	26MHz or less
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Transmitting mode
Test results:	Pass

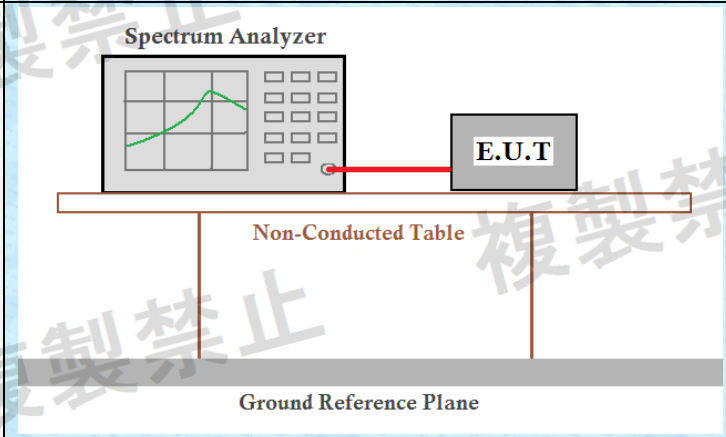
Measurement Data: The detailed test data see Appendix for Zigbee.

6.4 Spurious emission intensity

Test condition:	Test diffusion code and modulate with standard coding test signal
Measurement procedure:	**Step 1** All spurious are measured from 30MHz to 13GHz by peak mode. **Step 2** If the value measured by Step1 is 3dB or less to the limit, measure in average mode.
Spectrum set:	**Step 1:** Test Frequency: test channel, Below 1GHz, RBW=VBW=100KHz; Above 1GHz, RBW=VBW=1MHz, Sweep time=Auto, Detector mode=Positive peak **Step 2:** Test Frequency: spurious frequency Below 1GHz, RBW=VBW=100KHz; Above 1GHz, RBW=VBW=1MHz, Sweep time=Auto, Detector mode=Sample, Span=0Hz
Limit:	Below 1G: 0.25uW or less Below 2387 MHz: 2.5μW/MHz or less 2387 to 2400 MHz: 25μW/MHz or less 2483.5 through 2496.5 MHz: 25μW/MHz or less Over 2496.5 MHz: 2.5μW/MHz or less
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix for Zigbee.

6.5 Limit of secondary radiated emissions

Test condition:	Receiving mode
Measurement procedure:	**Step 1** All spurious are measured from30MHz to 13GHz by peak mode. **Step 2** If the value measured by Step1 is 3dB or less to the limit, measure in average mode.
Spectrum set:	**Step 1:** Test Frequency: test channel, Below 1GHz, RBW=VBW=100KHz; Above 1GHz, RBW=VBW=1MHz, Sweep time=Auto, Detector mode=Positive peak **Step 2:** Test Frequency: spurious frequency Test Frequency: test channel, Below 1GHz, RBW=VBW=100KHz; Above 1GHz, RBW=VBW=1MHz, Sweep time=Auto, Detector mode=Sample, Span=0Hz
Limit:	Below 1GHz: 4.0nW or less Above 1GHz: 20nW or less
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix for Zigbee.

6.6 Interference suppression

Measurement procedure:	(1) 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. (2) 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.
Test setup:	Radio equipment — Demodulator CMW500
Test Instruments:	Refer to section 5.8 for details
Test results:	Pass

Measurement data:

Identification function:	Good
Mac address:	00:12:4B:00:1C:E8:7F:32

7 Test Setup Photo

Reference to the **appendix I** for details

8 EUT Constructional Details

Reference to the **appendix II** for details

------End------