

FCC Test Report

Report No.: AGC02182200901FE03

FCC ID	: 2AUEW-ZH100
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: Wireless headphones
BRAND NAME	: Zamkol
MODEL NAME	: ZH100, IBT92D
APPLICANT	: SHENZHEN YIKEXIN NETWORK TECHNOLOGY CO., LTD.
DATE OF ISSUE	: Sep. 27, 2020
STANDARD(S)	: FCC Part 15.247
REPORT VERSION	: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	. /	Sep. 27, 2020	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	SHENZHEN YIKEXIN NETWORK TECHNOLOGY CO., LTD.
Address	604, 28#, Anjinheng Building, Songhe Community, Longhua Street, Longhua District, Shenzhen
Manufacturer	SHENZHEN INECAN ELECTRONIC CO., LTD
Address	54A, PUXIA ROAD LIUYUE COMMUNITY, HENGGANG STREET, LONGGANG DISTRICT, SHENZHEN, GUANGDONG PROVINCE 518173, CHINA.
Factory	SHENZHEN INECAN ELECTRONIC CO., LTD
Address	54A, PUXIA ROAD LIUYUE COMMUNITY, HENGGANG STREET, LONGGANG DISTRICT, SHENZHEN, GUANGDONG PROVINCE 518173, CHINA.
Product Designation	Wireless headphones
Brand Name	Zamkol
Test Model	ZH100
Series Model	IBT92D
Difference Description	All the same except for the appearance color.
Date of test	Sep. 21, 2020 to Sep. 27, 2020
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC PART 15.247.

Prepared By

Eddy · Liu

Eddy Liu (Project Engineer)

Sep. 27, 2020

Max Zhan

Reviewed By

Max Zhang (Reviewer)

Sep. 27, 2020

Approved By

fowe

Forrest Lei (Authorized Officer)

Sep. 27, 2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "Wireless headphones". It is designed by way of utilizing the GFSK, Pi/4 DQPSK and 8DPSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480 GHz
RF Output Power	3.277dBm (Max)
Bluetooth Version	V5.0
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	V2.0
Software Version	V2.6
Antenna Designation	PCB Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	0dBi
Power Supply	DC 3.7V by battery or DC 5V by USB
Note: The EUT doesn't supp	ort BLE.

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
8	61	2403 MHz
30 .0		
	38	2440 MHz
2402~2480MHz	39	2441 MHz
	40	2442 MHz
	G : C	
Θ	77	2479 MHz
	78	2480 MHz

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2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHz, in every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally, the type of connection (e.g. single of multi slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also, the slave of the connection will use these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a hopping sequence in data mode: 40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67 56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59 72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75 09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06 01, 51, 03, 55, 05, 04

2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection.

2. Internal master clock.

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24MSB's of the 48BD_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For behavior action with other units only offset is used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day(23h30). In most case it is implemented as 28 bits counter. For the deriving of the hopping sequence the entire. LAP (24 bits),4LSB's(4bits) (Input 1) and the 27MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the

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Bluetooth clock has a different value, because the period between the two transmission is longer (and it Cannot be shorter) than the minimum resolution of the clock(312.5us). The hopping sequence will always differ from the first one.

2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AUEW-ZH100** filing to comply with the FCC PART 15.247 requirements.

2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.10. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y \pm U, where expended uncertainty U is based on a standard

uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, Uc = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, $Uc = \pm 0.8$ dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %
- Uncertainty of Dwell Time: $Uc = \pm 2\%$
- Uncertainty of Frequency: $Uc = \pm 2 \%$

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel π/4-DQPSK
5	Middle channel π/4-DQPSK
6	High channel π/4-DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	Hopping mode GFSK
11	Hopping mode π/4-DQPSK
12	Hopping mode 8DPSK

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.

2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

Software Setting

EST	
RF	COMM COM3 Close
-HW TEST	SW TEST
Enter DUT	Freq 02 + TX RX C DateType Ph9 + Exit Test mode
	Power 2 + Hopping PacketType 3-DHS + Config
OUT TEST MODE STAR	
CMD] config,d_mode:	Tfrq:80, power_level:2, p_mode:6, hopping:1, rx_mode:0, afh_mode:0, afh_jpn:0, ble:0 1.freq:80, power:2, p_mode:3, hopping:1, rx_mode:0, afh:0, jpn:0, ble:0.
OUT TEST MODE STAR (CMD] config,d_mode:	Tfrq:80, power_level:2, p_mode:3, hopping:1, rx_mode:0, afh_mode:0, afh_jpn:0, ble:0 1,freq:2, power:2, p_mode:3, hopping:0, rx_mode:0, afh:0, jpn:0, ble:0.
DUT TEST MODE STAR	Tfrq:2, power_level:2, p_mode:3, hopping:0, rx_mode:0, afh_mode:0, afh_jpn:0, ble:0 1.freq:2, power:2, p_mode:6, hopping:0, rx_mode:0, afh:0, jpn:0, ble:0.

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

EUT

Conducted Emission Configure:

	0	
EUT		AE

5.2. EQUIPMENT USED IN TESTED SYSTEM

ltem	Equipment	Model No.	ID or Specification	Remark
1	Wireless headphones	ZH100	2AUEW-ZH100	EUT
2	Control Box	N/A	USB-TTL	AE
3	USB Cable	N/A	0.6m unshielded	Accessory

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(1)	Peak Output Power	Compliant
15.247 (a)(1)	20 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.209	Radiated Emission	Compliant
15.247 (a)(1)(iii)	Number of Hopping Frequency	Compliant
15.247 (a)(1)(iii)	Time of Occupancy	Compliant
15.247 (a)(1)	Frequency Separation	Compliant
15.207	Conducted Emission	Not applicable

Note: The conducted emission tests at AC port are not required for devices which only employ battery power for operation.

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China		
Designation Number	CN1259		
FCC Test Firm Registration Number	975832		
A2LA Cert. No.	5054.02		
Description	Attestation of Global Compliance (Shenzhen) Co., Ltd is accredited by A2LA		

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2020
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

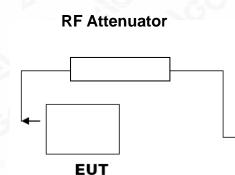
For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW \geq RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

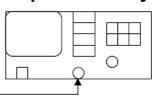
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

PEAK POWER TEST SETUP



Spectrum Analyzer



RF Cable

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7.3. LIMITS AND MEASUREMENT RESULT

	PEAK OUTPUT POWER MEA FOR GFSK MOUI		
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	0.836	21	Pass
2.441	0.883	21	Pass
2.480	0.873	21	Pass

CH0



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Keysight Spectrum Analyzer - Swept SA RL RF 50 Ω AC Center Freq 2.480000000	CORREC	SENSE:INT	ALIGN AUTO	08:13:03 PM Sep 24, 2020	Frequency
10 dB/div Ref 20.00 dBm	PNO: Fast +++	Trig: Free Run Atten: 30 dB	Avg Hold: 100/100	2.479 950 GHz 0.873 dBm	Auto Tuno
10.0		1			Center Fre 2.480000000 GH
-10.0 -20.0					Start Fre 2.477500000 GH
-20.0					Stop Fre 2.482500000 GH
-40.0					CF Ste 500.000 k⊢ <u>Auto</u> Ma
-60.0					Freq Offse 0 H
Center 2.480000 GHz #Res BW 1.5 MHz	#VBW 5	.0 MHz	Sweep 1	Span 5.000 MHz .000 ms (1001 pts)	
MSG			STATUS	3	

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PEAK OUTPUT POWER MEASUREMENT RESULT FOR Π/4-DQPSK MODULATION					
Frequency (GHz)Peak Power (dBm)Applicable Limits (dBm)Pass or Fail					
2.402	2.876	21	Pass		
2.441	2.958	21	Pass		
2.480	2.946	21	Pass		



CH0

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🚺 Keysight Spectrum Analyzer - Swept SA					- • • •
X RL RF 50 Ω AC Center Freq 2.480000000	GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr		Frequency
	PNO: Fast ++ IFGain:Low	 Trig: Free Run Atten: 30 dB 	Avg Hold: 100/100		Auto Tune
10 dB/div Ref 20.00 dBm			MKr	1 2.479 920 GHz 2.946 dBm	
					Center Free
10.0		∳1			2.480000000 GH
0.00	And the second design of the s				Start Free
10.0					2.477500000 GH
20.0 Hall Market and a second					Stop Fre
-30.0					2.482500000 GH
30.0					CF Ste
-40.0					500.000 kH Auto Ma
50.0					
60.0					Freq Offse 0 H
-70.0					
Center 2.480000 GHz #Res BW 1.5 MHz	#VBW	/ 5.0 MHz	Sweep	Span 5.000 MHz 1.000 ms (1001 pts)	
MSG			STAT	su	

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PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION					
Frequency (GHz)Peak Power (dBm)Applicable Limits (dBm)Pass or Fail					
2.402	3.107	21	Pass		
2.441	3.277	21	Pass		
2.480	3.242	21	Pass		



CH0

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Report No.: AGC02182200901FE03 Page 19 of 69



CH39



CH78

J Keysight Spectrum Analyzer - Swept SA	CORREC	OF NOT-THIT		00.15-51 DM C++ 24 2020	
Center Freq 2.480000000		SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	08:15:51 PM Sep 24, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ++- IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Hold: 100/100	DET PNNNN	
			Mkr1	2.480 025 GHz	Auto Tune
10 dB/div Ref 20.00 dBm				3.242 dBm	
					Center Fred
10.0		1			2.480000000 GHz
0.00					
					Start Fred
-10.0					2.477500000 GHz
مستعملكم الملاح					
-20.0					Stop Freq
-30.0					2.482500000 GHz
-40.0					CF Step 500.000 kHz
50 A					<u>Auto</u> Man
-50.0					
-60.0					Freq Offset
					0 Hz
-70.0					
Center 2.480000 GHz #Res BW 1.5 MHz	#\/P\M	5.0 MHz	Swoon	Span 5.000 MHz .000 ms (1001 pts)	
MSG	#VDW	5.0 10112	Sweep		
			STATU		

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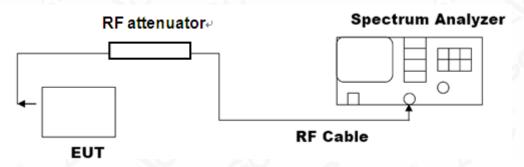


8. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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8.3. LIMITS AND MEASUREMENT RESULTS

MEASUREMENT RESULT FOR GFSK MOUDULATION					
Annliaghta Limita		Measurement Result			
Applicable Limits	Test Data (MHz) Criteria				
	Low Channel	1.028	PASS		
N/A	Middle Channel	1.032	PASS		
	High Channel	1.032	PASS		

08:12:03 PM Sep 24, 2020 SENSE:INT Center Freq: 2.402000000 GHz Trig: Free Run Avg|Hol #Atten: 30 dB Frequency 102000000 GHz Radio Std: None Avg|Hold: 100/100 #IFGain:Low Radio Device: BTS Ref 20.00 dBm **Center Freq** 2.402000000 GHz Center 2.402 GHz #Res BW 30 kHz Span 3 MHz Sweep 3.2 ms CF Step 300.000 kHz #VBW 100 kHz <u>Auto</u> 7.59 dBm **Occupied Bandwidth Total Power** 908.44 kHz Freq Offset 0 Hz **Transmit Freq Error** 5.209 kHz **OBW Power** 99.00 % x dB Bandwidth 1.028 MHz x dB -20.00 dB

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASUREMENT RESULT FOR II /4-DQPSK MODULATION					
Annlinghle Limite		Measurement Resu	lt		
Applicable Limits	Test Data	Test Data (MHz)			
N/A	Low Channel	1.365	PASS		
	Middle Channel	1.365	PASS		
	High Channel	1.365	PASS		

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASUREMENT RESULT FOR 8-DPSK MODULATION					
Measurement Result					
Applicable Limits	Test Data	Test Data (MHz)			
	Low Channel	1.350	PASS		
N/A	Middle Channel	1.351	PASS		
	High Channel	1.351	PASS		

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
 RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

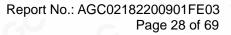
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT						
Annlinghig Limite	Measurement Result					
Applicable Limits	Test Data	Criteria				
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS				
power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS				

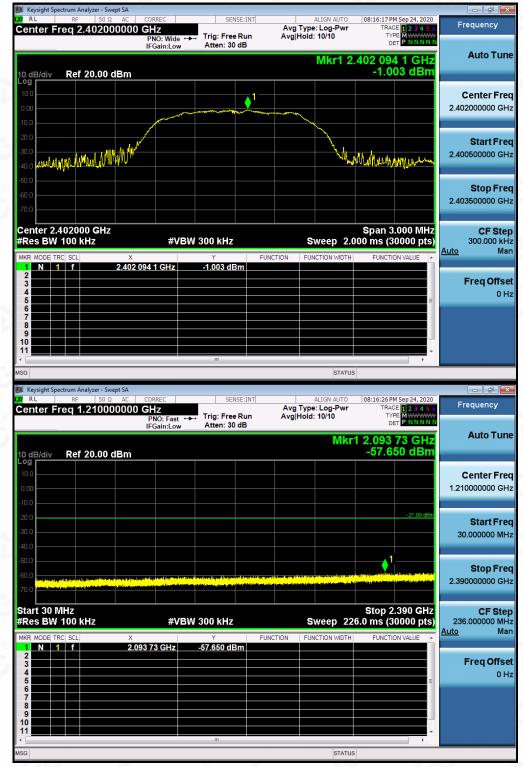
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TEST RESULT FOR ENTIRE FREQUENCY RANGE

TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 8DPSK MODULATION IN LOW CHANNEL



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🊺 Ke	ysight	Spect	rum A	Analyzer - S	Swept SA		_							_	
l,XI R			RF	50		CORREC		SEI	NSE:INT	A	ALIGN AUTO		M Sep 24, 2020 CE 1 2 3 4 5 6		Frequency
Cer	iter	Fre	ed ,	13.74	7500	DO GHz PNO: Fa		Trig: Free Atten: 30			: 10/10	TY	PE MWWWWW ET P N N N N N		
		_	_			IFGain:L	.ow	Atten: 3t	ub .		Mk	r1 4 80	4 3 GHz		Auto Tune
	B/div	,	Rei	20.00	dBm								49 dBm		
Log 10.0															Center Freq
0.00														13.7	41750000 GHz
-10.0	\vdash														
-20.0													-21.00 dBm		Start Freq
-30.0														2.4	83500000 GHz
-40.0			◄	1											
-50.0 -60.0				فليتنافذ وسرار	ير يوليا العربي	لعرب والمراجع والم	-	and a District of Street	فريقه والمقادر	ha albah ang		a fina ana isi ka			Stop Freq
-70.0	100,000			and setting and the set			and a second		and shall be a second					25.0	00000000 GHz
Start 2.48 GHz Stop 25.00 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.152 s (30000 pts)										2.2	CF Step 51650000 GHz				
	MODE				х			Y	FU	NCTION	ICTION WIDTH		DN VALUE	<u>Auto</u>	Man
1 2	N	1	f		4	1.804 3 GH	z	-47.649 dE	3m						
3															Freq Offset 0 Hz
5													E		0 H2
7															
9 10															
11													-		
MSG		_	_								 STATUS	;			

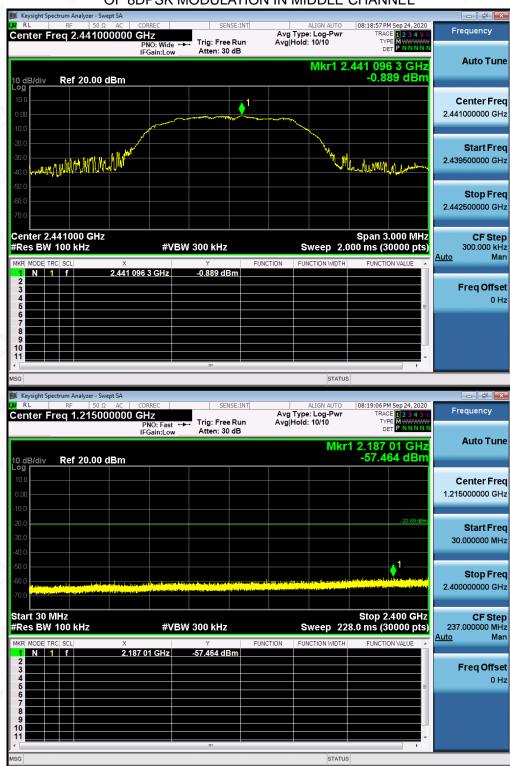
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 Attestation of Global Compliance(Shenzhen)Co., Ltd

 Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com





TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN MIDDLE CHANNEL

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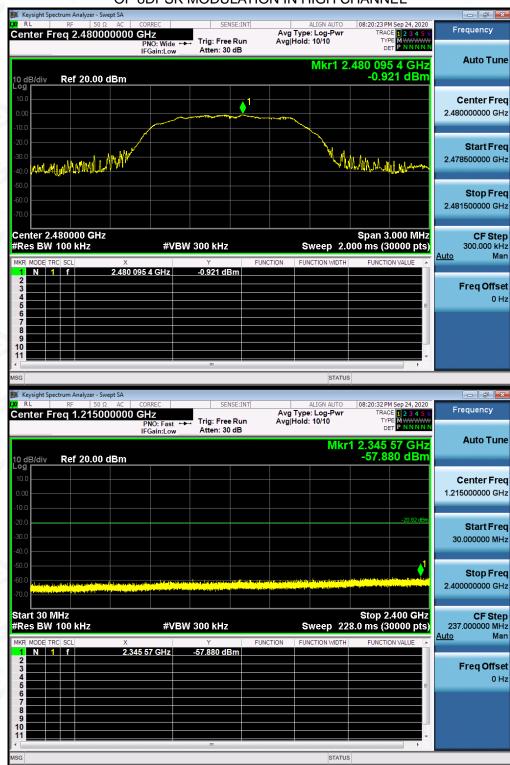
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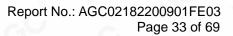
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TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN HIGH CHANNEL

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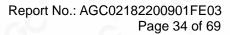




	ctrum Analyzer - Sw							7 X
Contor Fr	RF 50 Ω	AC CORREC	SENS		ALIGN AUTO	08:20:57 PM Sep 24, TRACE 1 2 3		су
	eq 13.7500	PNO: Fas IFGain:Lo		Run Avg	Hold: 10/10		WWW N N N	
10 dB/div	Ref 20.00	dBm			Mkr	1 24.181 7 G -48.950 dE	Hz Auto Bm	Tune
Log 10.0 0.00							Center 13.75000000	•
-20.0 -30.0 -40.0						-20.92	2 dBm 2.50000000 x 1 -	t Freq 10 GHz
-50.0 -60.0 -70.0					de la constante de la constante La constante de la constante de		Stop 25.0000000	Freq 00 GHz
Start 2.50 #Res BW	100 kHz	#\ X	/BW 300 kHz	FUNCTION	Sweep 2	Stop 25.00 G 2.152 s (30000 p FUNCTION VALUE	pts) 2.25000000 Auto	Step 0 GHz Man
I N I 2 3 4 3 4 5 6 7 6 7 8 9 10 1 4 4 4 4		^ 24.181 7 GHz			STATUS		Freq C	Offset 0 Hz

Note: The 8DPSK modulation is the worst case and only those data recorded in the report.

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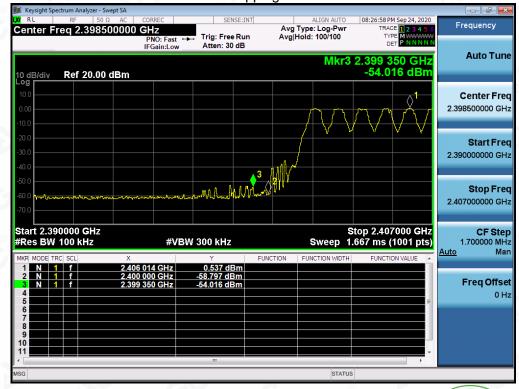
TEST RESULT FOR BAND EDGE

GFSK MODULATION IN LOW CHANNEL

Hopping off



Hopping on



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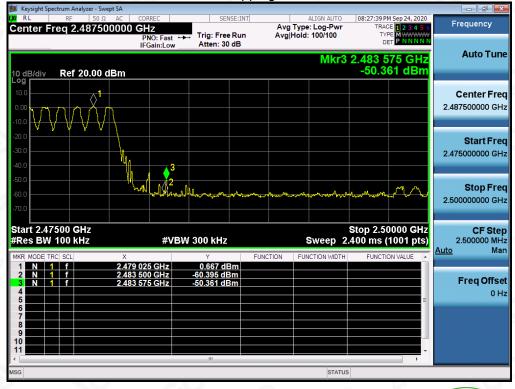




GFSK MODULATION IN HIGH CHANNEL

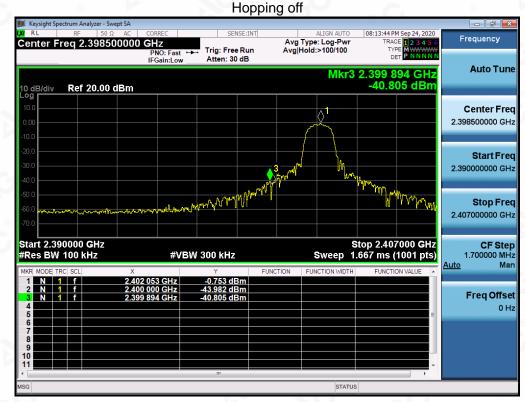
Hopping off

Hopping on



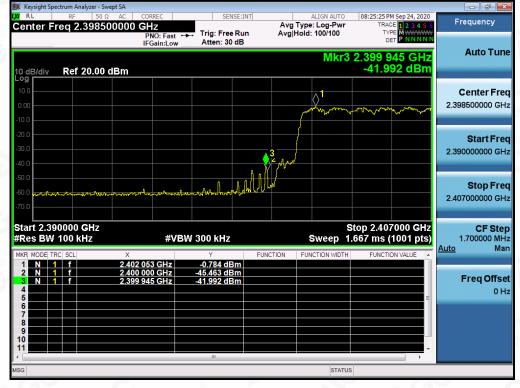
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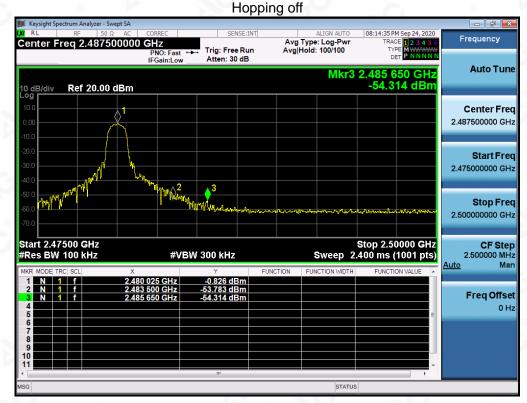
π /4-DQPSK MODULATION IN LOW CHANNEL

Hopping on



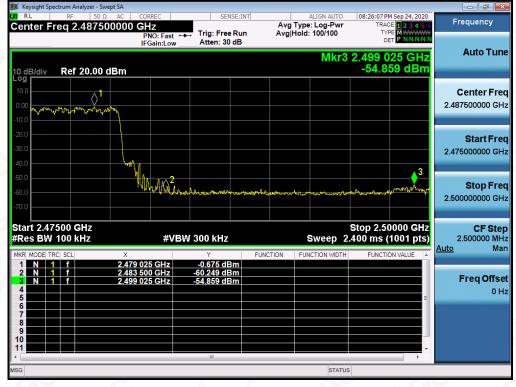
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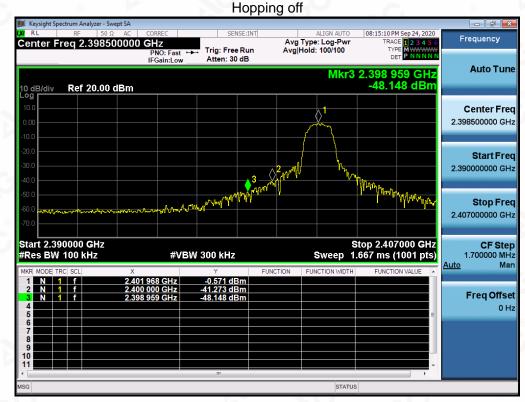
π /4-DQPSK MODULATION IN HIGH CHANNEL

Hopping on



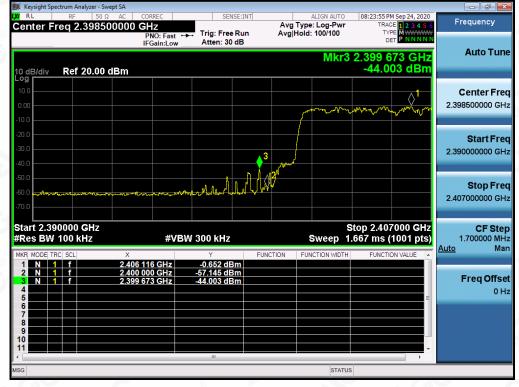
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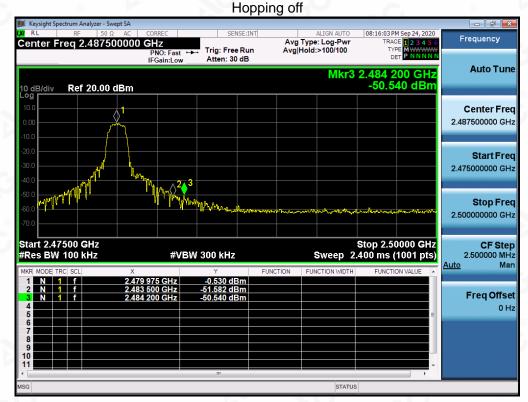
8-DPSK MODULATION IN LOW CHANNEL

Hopping on



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8-DPSK MODULATION IN HIGH CHANNEL

Hopping on



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10. RADIATED EMISSION

10.1. MEASUREMENT PROCEDURE

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

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The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting		
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP		
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP		
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP		
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average		

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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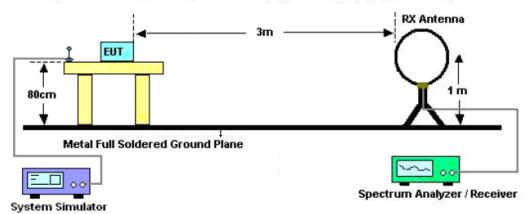
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 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com
 Web: http://cn.agc-cert.com/

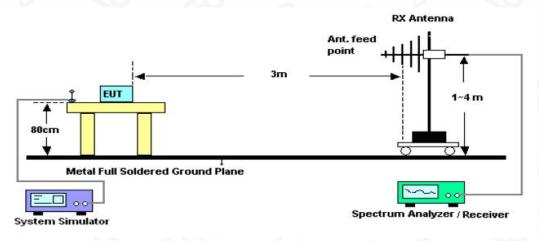


10.2. TEST SETUP

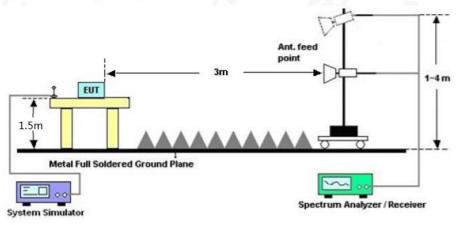
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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10.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

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

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

10.4. TEST RESULT

RADIATED EMISSION BELOW 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

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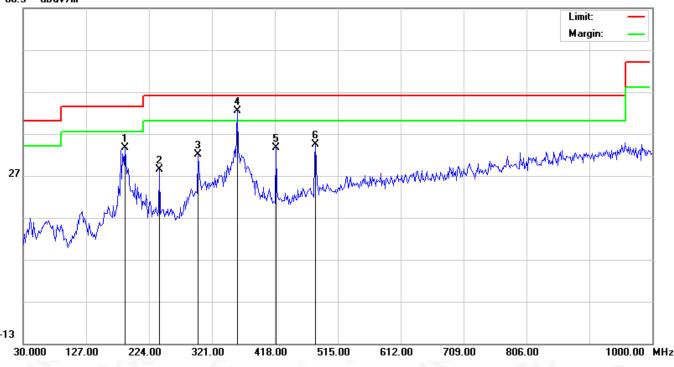


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RADIATED EMISSION BELOW 1GHz

EUT	Wireless headphones Model Name		ZH100
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Horizontal

66.9 dBuV/m



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		186.8167	21.89	11.79	33.68	43.50	-9.82	peak
2		240.1667	9.65	18.66	28.31	46.00	-17.69	peak
3		299.9833	10.54	21.47	32.01	46.00	-13.99	peak
4	*	359.8000	21.15	21.18	42.33	46.00	-3.67	peak
5		419.6167	11.74	21.77	33.51	46.00	-12.49	peak
6		481.0500	10.13	24.23	34.36	46.00	-11.64	peak

RESULT: PASS

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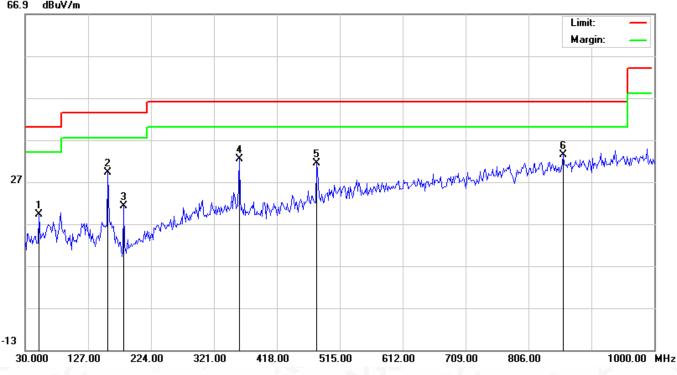
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EUT	Wireless headphones	Model Name	ZH100
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Vertical

66.9 dBuV/m



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		51.0167	5.32	13.95	19.27	40.00	-20.73	peak
2		157.7167	10.52	18.62	29.14	43.50	-14.36	peak
3		181.9667	9.88	11.32	21.20	43.50	-22.30	peak
4		359.8000	11.26	21.18	32.44	46.00	-13.56	peak
5		479.4333	7.20	24.17	31.37	46.00	-14.63	peak
6	*	859.3500	2.29	31.18	33.47	46.00	-12.53	peak

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been pre-tested. The mode 7 is the worst case and recorded in the report.

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RADIATED EMISSION ABOVE 1GHz

EUT	Wireless headphones	Model Name	ZH100
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	44.98	0.08	45.06	74	-28.94	peak
4804.000	38.25	0.08	38.33	54	-15.67	AVG
7206.000	42.12	2.21	44.33	74	-29.67	peak
7206.000	33.66	2.21	35.87	54	-18.13	AVG
5	.C			NO Y	0.5	
emark:		<u>у</u> г	0			
actor = Anter	nna Factor + Cab	le Loss – Pre-	amplifier.	8		

EUT	Wireless headphones	Model Name	ZH100
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	45.11	0.08	45.19	74	-28.81	peak
4804.000	37.13	0.08	37.21	54	-16.79	AVG
7206.000	40.05	2.21	42.26	74	-31.74	peak
7206.000	31.12	2.21	33.33	54	-20.67	AVG
- C.	0		S -	- C	0	
				2	.O	
emark:						<u>C</u>
	na Factor + Cable	e Loss – Pre-a	molifier.		<u> </u>	

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EUT	Wireless headphones	Model Name	ZH100
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 8	Antenna	Horizontal

	eter Reading	Factor	Emission Level	Limits	Margin	
,	J				0	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
82.000	46.11	0.14	46.25	74	-27.75	peak
82.000	39.43	0.14	39.57	54	-14.43	AVG
23.000	39.25	2.36	41.61	74	-32.39	peak
23.000	33.99	2.36	36.35	54	-17.65	AVG
8				0		
	©				8	
ark:	•					

EUT	Wireless headphones	Model Name	ZH100
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 8	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4882.000	46.33	0.14	46.47	74	-27.53	peak
4882.000	39.25	0.14	39.39	54	-14.61	AVG
7323.000	41.98	2.36	44.34	74	-29.66	peak
7323.000	34.05	2.36	36.41	54	-17.59	AVG
8						
- G	8				C	0
emark:	e Ci	®				C.
actor = Anter	nna Factor + Cable	Loss – Pre-	amplifier.			

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			711/00
EUT	Wireless headphones	Model Name	ZH100
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	44.11	0.22	44.33	74	-29.67	peak
4960.000	39.25	0.22	39.47	54	-14.53	AVG
7440.000	42.98	2.64	45.62	74	-28.38	peak
7440.000	33.09	2.64	35.73	54	-18.27	AVG
®				®		

EUT ZH100 Wireless headphones **Model Name** 25°C 55.4% Temperature **Relative Humidity** 960hPa Pressure **Test Voltage** Normal Voltage **Test Mode** Mode 9 Antenna Vertical

JV) (dl 23 0.2 25 0.2 77 2.6	22 22	dBµV/m) 46.45 39.47	(dBµV/m) 74 54	(dB) -27.55 -14.53	Value Type peak AVG
25 0.2	22		(%)		
-		39.47	54	-14.53	AVG
77 26	1				
2.0	04	45.41	74	-28.59	peak
23 2.6	64	36.87	54	-17.13	AVG
			©		<u> </u>
	23 2.6	23 2.64	23 2.64 36.87	23 2.64 36.87 54	23 2.64 36.87 54 -17.13

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

RESULT: PASS

Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

All test modes had been tested. The 8DPSK modulation is the worst case and recorded in the report.

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