

FCC

RF Test Report

Product Name: Smart Phone

Model Number: MGA-LX3

Report No.: SYBH(Z-RF)20220105022001-2003

FCC ID: 2ATEYMGA-LX3

Authorized	Name	Date
Prepared by:	Qin Jianwei	2022-02-17
Reviewed by:	Lin Jiekai	2022-02-17
Approved by:	He Hao	2022-02-17

Reliability Laboratory of Huawei Technologies Co., Ltd.

No.2, New City Avenue, Songshan Lake Sci. & Tech. Industry Park, Dongguan, 523808, P.R.C
Telephone: +86 769 23830808 Fax: +86 769 23837628

Notice

1. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
2. The laboratory has been recognized by the US Federal Communications Commission (FCC) to perform compliance testing subject to the Commission's Certification rules. The Designation Number is CN1173, and the Test Firm Registration Number is 294140.
3. The laboratory has been recognized by the Innovation, Science and Economic Development Canada (ISED) to test to Canadian radio equipment requirements. The CAB identifier is CN0003, and the ISED# is 21741.
4. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named "Global Compliance and Testing Center of Huawei Technologies Co., Ltd", the both names have coexisted since 2009.
5. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
6. The test report is invalid if there is any evidence of erasure and/or falsification.
7. The test report is only valid for the test samples.
8. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
9. If any question about this report, please contact the laboratory (PublicGCTC@huawei.com).

MODIFICATION RECORD

No.	Report No	Modification Description
1	SYBH(Z-RF)20220105022001-2003	First release.

DECLARATION

Type	Description
Multiple Models Applications	☒ The present report applies to single model.
	☐ The present report applies to several models. The practical measurements are performed with the model.
	The present report only presents the worst test case of all modes, see relevant test results for detailed.

1 Table of contents

1	Table of contents.....	4
2	General Information	5
2.1	Test standard/s.....	5
2.2	Test Environment	5
2.3	Test Laboratories.....	5
2.4	Applicant and Manufacturer.....	6
2.5	Application details.....	6
3	Test Summary.....	6
4	Description of the Equipment under Test (EUT)	8
4.1	General Description.....	8
4.2	EUT Identity.....	8
4.3	Technical Description	10
5	General Test Conditions / Configurations	11
5.1	EUT Configurations	11
5.2	Test Setups	13
5.3	Test Conditions.....	16
6	Main Test Instruments.....	17
6.1	Current Test Project/Report.....	17
7	Measurement Uncertainty	18
8	Appendixes	19

2 General Information

2.1 Test standard/s

Applied Rules :	47 CFR FCC Part 2, Subpart J 47 CFR FCC Part 15, Subpart C
Test Method :	FCC KDB 558074 D01 DTS Meas Guidance v05r02 ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.

2.2 Test Environment

Temperature :	TN	15 to 30	°C during room temperature tests
Ambient Relative Humidity:	25 to 75 %		
Atmospheric Pressure:	Not applicable		
Power supply :	VN	3.87	V DC by Battery

NOTE 1: 1) VN= nominal voltage, VL= low extreme test voltage, VH= High extreme test voltage;

TN= normal temperature, TL= low extreme test temperature, TH= High extreme test temperature.

NOTE 2: The values used in the test report may be stringent than the declared.

2.3 Test Laboratories

Test Location 1 :	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Address of Test Location 1 :	No.2 New City Avenue, Songshan Lake Science & Technology Industry Park Dongguan, Guangdong, 523808, People's Republic of China
Temperature of Test Location 1 :	25°C
Relative humidity of Test Location 1 :	55 %

2.4 Applicant and Manufacturer

Company Name :	Huawei Device Co., Ltd.
Address :	No.2 of Xincheng Road, Songshan Lake Zone, Dongguan, Guangdong 523808, People's Republic of China

2.5 Application details

2.5.1 Current Test Project/Report

Date of Receipt Sample:	2022-01-10
Start of test:	2022-01-11
2022-02-08	2022-02-08

3 Test Summary

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
DTS (6 dB) Bandwidth	15.247(a)(2)	≥ 500 kHz.	Appendix A	Pass	Test Location 1
Occupied Bandwidth	---	No limit.	Appendix B	Pass	Test Location 1
Duty Cycle	KDB 558074 D01(6.0)	No limit.	Appendix C	Pass	Test Location 1
Maximum Conducted Average Output Power	15.247(b)(3)	FCC: For directional gain: Conducted < 30 dBm – (G[dBi] – 6 [dB]); Otherwise: Conducted < 30 dBm,	Appendix D	Pass	Test Location 1
Maximum Power Spectral Density Level	15.247(e)	Conducted < 8 dBm/3 kHz.	Appendix E	Pass	Test Location 1
Band Edges Compliance	15.247(d)	< -30 dBm/100 kHz if total average power $\leq$ power limit.	Appendix F	Pass	Test Location 1
Unwanted Emissions into Non-Restricted Frequency Bands			Appendix G	Pass	Test Location 1
Unwanted Emissions into Restricted Frequency Bands (Radiated)	15.247(d) 15.209 (NOTE 1)	FCC Part 15.209 field strength limit;	Appendix H	Pass	Test Location 1

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
AC Power Line Conducted Emissions	15.207	FCC Part 15.207 conducted limit;	Appendix I	Pass	Test Location 1
NOTE1 : According to KDB 558074 D01, antenna-port conducted measurements are acceptable as an alternative to radiated measurements for demonstrating compliance to the limits in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case emissions will also be required. NOTE2: The transmitter has an integral PCB loop antenna that is enclosed within the housing of the EUT and meets the requirements of FCC 15.203					

4 Description of the Equipment under Test (EUT)

4.1 General Description

MGA-LX3 is subscriber equipment in the GSM/WCDMA/LTE system. The GSM frequency bands include GSM850, GSM900, DCS1800 and PCS1900. The WCDMA frequency band includes band I, band II, band IV, band V, band VIII. The LTE frequency bands include band 1, band 2, band 3, band 4, band 5, band 7, band 8, band 13, band 28, band 38, band 26, band 66. The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/WCDMA and GSM protocol processing, voice, video MMS service, GPS, AGPS, Wi-Fi etc. Externally it provides earphone port (to provide voice service), and dual SIM/single SIM card interface. MGA-LX3 is dual/single SIM smart phone. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

Note1: Only Bluetooth BLE test data included in this report.

4.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

4.2.1 Board

Board	Description	
Product Name :	Smart Phone	
Model name :	MGA-LX3	
SN :	Conducted	5VEBB21C24200133
	Radiated	5VEBB21C24200003
Software Version :	6.0.0.28(C900E28R1P1)	
Hardware Version :	HL1MGASU	

4.2.2 Sub- Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-100225E00	Huawei Device Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V/2A,9V/2A,10V/2.25A
Adapter	HW-100225B00	Huawei Device Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V/2A,9V/2A,10V/2.25A
Adapter	HW-100225U00	Huawei Device Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V/2A,9V/2A,10V/2.25A
Adapter	HW-100225A00	Huawei Device Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V/2A,9V/2A,10V/2.25A
Battery	HB536896EFW	Huawei Device Co., Ltd.	Rated capacity: 5900mAh Nominal Voltage:  +3.87V Charging Voltage:  +4.45V
Battery	HB536896EFW-1	Huawei Device Co., Ltd.	Rated capacity: 5900mAh Nominal Voltage:  +3.87V Charging Voltage:  +4.45V

4.3 Technical Description

NOTE: For the detailed technical descriptions, see the applicant/manufacture's specifications or user manual.

Characteristics	Description	
Operating Mode	Non-FHSS	Bluetooth 5.1
TX/RX Operating Range	2400-2483.5 MHz band	$f_c = 2402 \text{ MHz} + N * 2 \text{ MHz}$, where: - f_c = "Operating Frequency" in MHz, - N = "Channel Number" with the range from 0 to 39.
Modulation Type	Digital	GFSK,
Emission Designator	GFSK for 1Mbps: 736KF1D GFSK for 2Mbps: 1M24G1D	
Bluetooth Power Class	Class 1	
Antenna	Description	Isotropic Antenna
	Type	☒ Integral (permanent fixed antenna, which may be built-in, designed as an indispensable part of EUT) ☐ Dedicated (removable antenna supplied with EUT, designed as an indispensable part of EUT)
	Ports	☒ Ant 1, ☐ Ant 2, ☐ Ant 3
	Gain	-2.3 dBi (per antenna port, max.)
	Remark	When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.
Power Supply	Type	☐ External DC mains, ☒ Battery, ☐ AC/DC Adapter, ☐ Powered over Ethernet (PoE). ☐ USB ☐ Other_____

5 General Test Conditions / Configurations

5.1 EUT Configurations

5.1.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, - All TX tests are performed at all TX antenna ports of the EUT, and - All RX tests are performed at all RX antenna ports of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.
Sensors and Antenna	Sensors and Antenna optimization function should be disabled during testing by software method to get the stable maximum power and avoid the influence of uncertain conditions

5.1.2 Customized Configurations

# EUT Conf.	Signal Description	Operating Frequency	Duty cycle
BLE_TM1_Ch0	GFSK for BLE modulation, Data Rate 1Mbps	Ch No. 0 / 2402 MHz	85.2%
BLE_TM1_Ch19	GFSK for BLE modulation, Data Rate 1Mbps	Ch No. 19 / 2440 MHz	85.2%
BLE_TM1_Ch39	GFSK for BLE modulation, Data Rate 1Mbps	Ch No. 39 / 2480 MHz	85.2%
BLE_TM2_Ch0	GFSK for BLE modulation, Data Rate 2Mbps	Ch No. 0 / 2402 MHz	56.9%
BLE_TM2_Ch19	GFSK for BLE modulation, Data Rate 2Mbps	Ch No. 19 / 2440 MHz	56.9%
BLE_TM2_Ch39	GFSK for BLE modulation, Data Rate 2Mbps	Ch No. 39 / 2480 MHz	56.9%

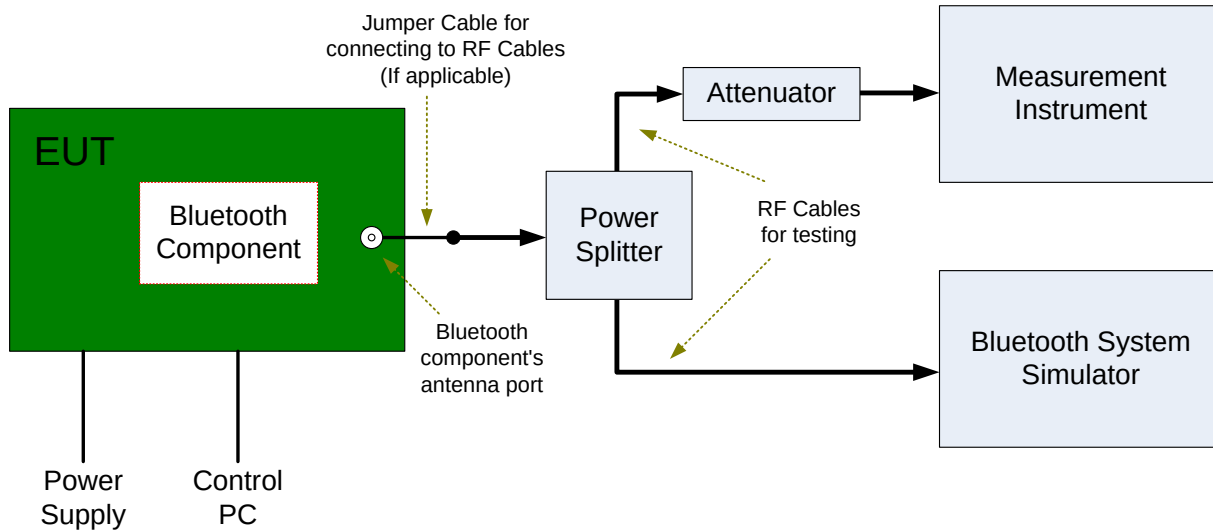
5.1.3 The Typica and worst case operational mode for each of the following tests

Test Item	Mode	Antenna
6dB Emission Bandwidth (EBW)	All	All
Occupied Bandwidth	All	All
Duty Cycle	All	All
Maximum peak Conducted Output Power	All	All
Maximum Power Spectral Density Level	All	All
Band edge spurious emission	All	All
Unwanted Emissions into Non-Restricted Frequency Bands	All	All
Unwanted Emissions into Restricted Frequency Bands (Radiated)	All	All
AC Power Line Conducted Emissions	All	Ant1

5.2 Test Setups

5.2.1 Test Setup 1

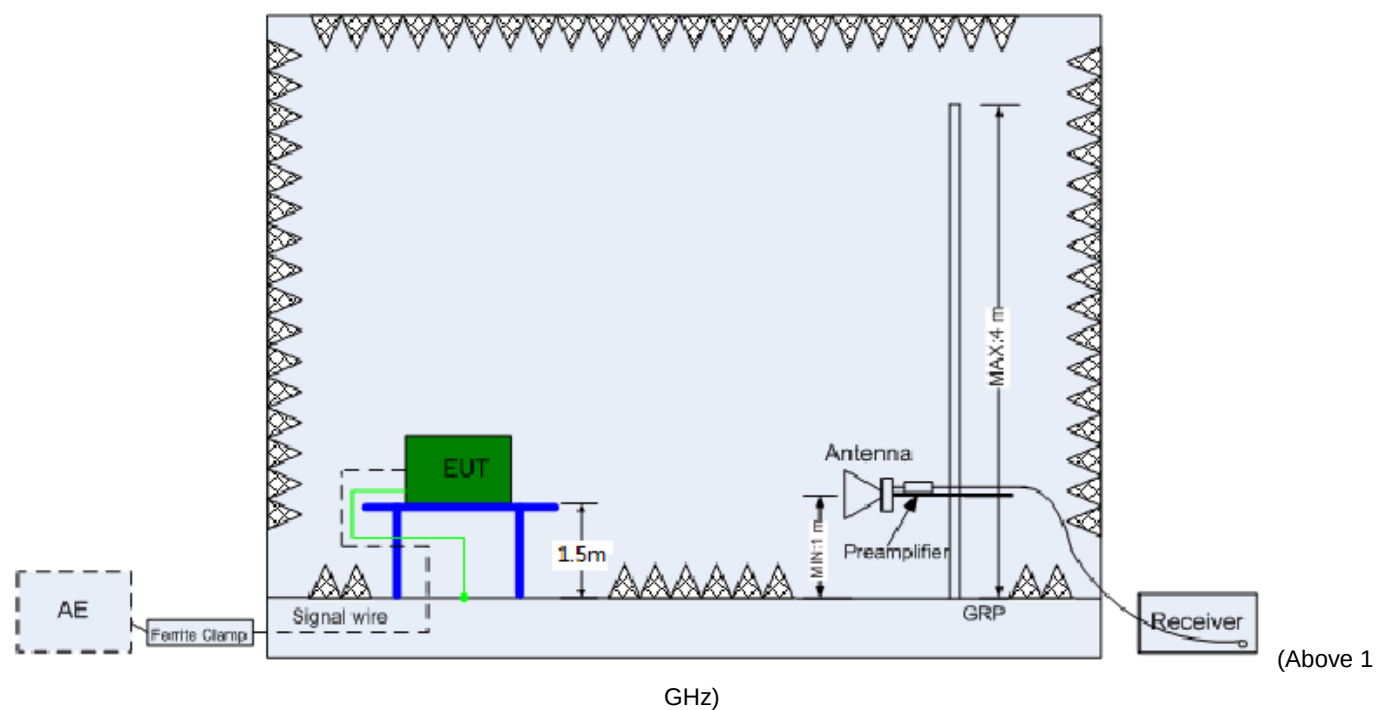
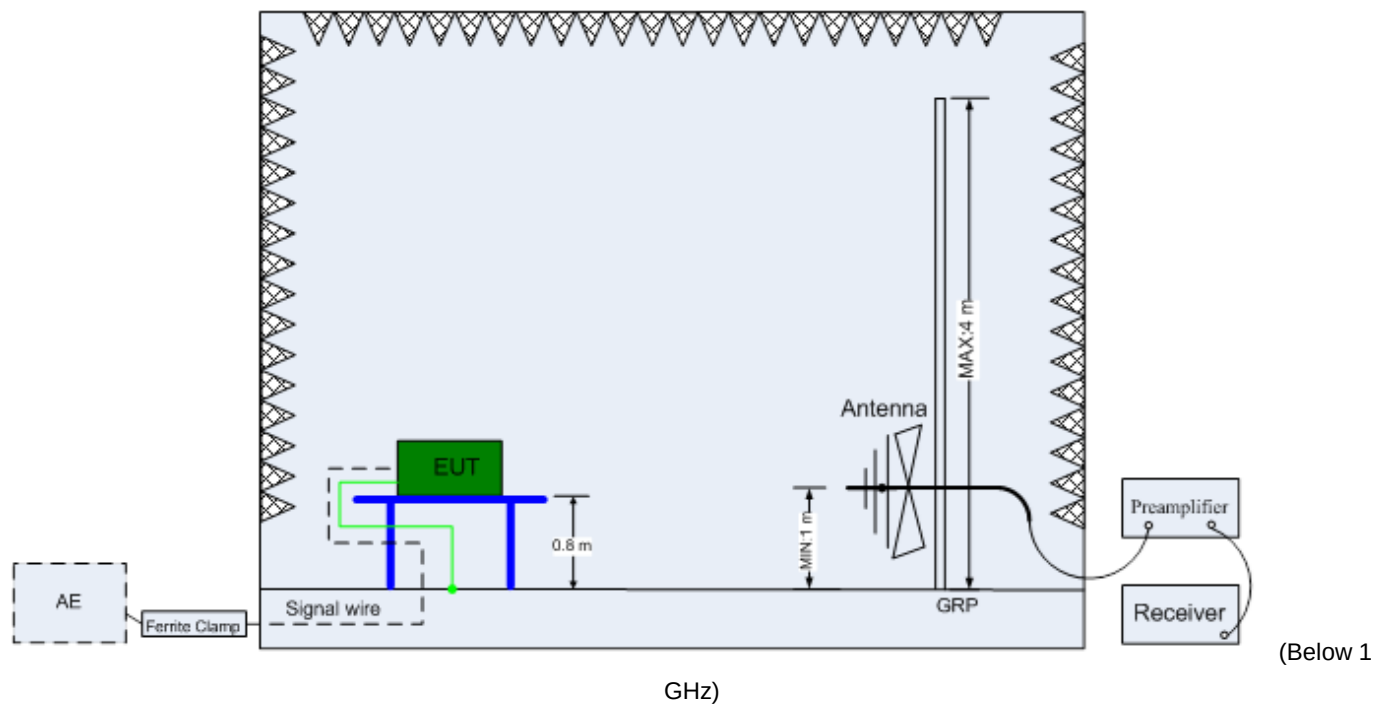
The Bluetooth component's antenna port(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by Bluetooth System Simulator and/or PC/software to emit the specified signals for the purpose of measurements.



5.2.2 Test Setup 2

The semi-anechoic chamber and full-anechoic chamber has met the requirement of ANSI C63.4. The test distance is 3m. The setup is according to ANSI C63.4 and CAN/CSA-CEI/IEC CISPR 22.

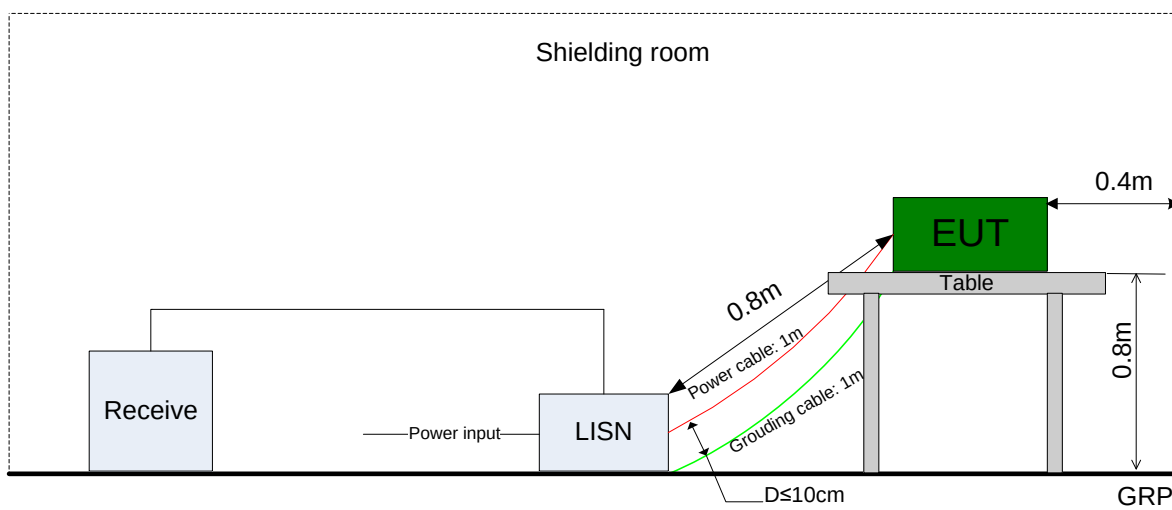
The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).



5.2.3 Test Setup 3

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.



5.3 Test Conditions

Test Case	Test Conditions	
	Configuration	Description
6dB Emission Bandwidth (EBW)	Meas. Method	FCC KDB 558074 D01 §8.2 Option 1.
	Test Env.	TN/VN
	Test Setup	Test Setup 1
	EUT Conf.	See §5.1
Occupied Bandwidth	Meas. Method	ANSI C63.10 Section 6.9.3
	Test Env.	TN/VN
	Test Setup	Test Setup 1
	EUT Conf.	See §5.1
Maximum peak Conducted Output Power	Meas. Method	FCC KDB 558074 D01 §8.3.1.1
	Test Env.	TN/VN
	Test Setup	Test Setup 1
	EUT Conf.	See §5.1
Maximum Power Spectral Density Level	Meas. Method	FCC KDB 558074 D01 §8.4
	Test Env.	TN/VN
	Test Setup	Test Setup 1
	EUT Conf.	See §5.1
Band edge spurious emission	Meas. Method	FCC KDB 558074 D01§8.7
	Test Env.	TN/VN
	Test Setup	Test Setup 1
	EUT Conf.	See §5.1
Unwanted Emissions into Non-Restricted Frequency Bands	Meas. Method	FCC KDB 558074 D01§8.5
	Test Env.	TN/VN
	Test Setup	Test Setup 1
	EUT Conf.	See §5.1
Unwanted Emissions into Restricted Frequency Bands (Radiated)	Meas. Method	ANSI C63.10; FCC KDB 558074 D01§8.6, Radiated
	Test Env.	TN/VN
	Test Setup	Test Setup 2
	EUT Conf.	See §5.1
AC Power Line Conducted Emissions	Meas. Method	AC mains conducted. Pre: RBW = 10 kHz; Det. = Peak. Final: RBW = 9 kHz; Det. = CISPR Quasi-Peak & Average.
	Test Env.	TN/VN
	Test Setup	Test Setup 3
	EUT Conf.	See §5.1

6 Main Test Instruments

6.1 Current Test Project/Report

Main Test Equipments(BT/WIFI test system)					
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
JS1120-3 BT/WIFI test system	JS Tonscend	JS0806-2	188060102	2021/11/12	2022/11/11
Power Sensor	R&S	NRP2	103085/106211	2021/03/13	2022/03/12
Temperature Chamber	WEISS	WKL64	5624601330010	2021/03/17	2022/03/16
Spectrum Analyzer	R&S	FSW26	101787	2021/07/02	2022/07/01
Spectrum Analyzer	Agilent	N9020A	MY52090652	2021/11/11	2022/11/10
Universal Radio Communication Tester	R&S	CMW500	163743	2021/03/13	2022/03/12
Signal generator	Agilent	E8257D	MY49281095	2021/07/02	2022/07/01
Vector Signal Generator	R&S	SMW200A	103447	2021/11/10	2022/11/09

Main Test Equipments(RSE test system)					
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
Universal Radio Communication Tester	R&S	CMW500	A111278719	2021/01/30	2022/01/29
Spectrum analyzer	R&S	FSW26	101455	2021/11/13	2022/11/12
Spectrum analyzer	R&S	FSW43	104070	2021/11/13	2022/11/12
Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	01330	2020/08/10	2022/08/09
Double-Ridged Waveguide Horn Antenna (3G~18GHz)	SCHWARZB ECK	BBHA 9120D	01931	2021/05/08	2023/05/07
Pyramidal Horn Antenna(18GHz-40GHz)	SCHWARZB ECK	BBHA 9170	00863	2021/05/13	2023/05/12
Software Information					
Test Item	Software Name		Manufacturer		Version
RSE	TS+		Tonscend		Ver2.1

7 Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
Transmit Output Power Data	Power [dBm]	U = 0.39 dB
RF Power Density, Conducted	Power [dBm]	U = 0.66 dB
Bandwidth	Magnitude [%]	U=7%
Band Edge Compliance	Disturbance Power [dBm]	U = 0.9 dB
Spurious Emissions, Conducted	Disturbance Power [dBm]	20MHz~3.6GHz: U=0.88dB 3.6GHz~8.4GHz: U=1.08dB 8.4GHz~13.6GHz: U=1.24dB 13.6GHz~22GHz: U=1.34dB 22GHz~26.5GHz: U=1.36dB
Field Strength of Spurious Radiation	ERP/EIRP [dBm]	For 3 m Chamber: U = 3.868 dB (9 kHz to 150 kHz) U = 3.782 dB (150 kHz to 30 MHz) U = 5.24 dB (30 MHz-1 GHz) U = 4.84 dB (1 GHz-18 GHz) U = 4.62 dB (18 GHz-26.5 GHz)
AC Power Line Conducted Emissions	Disturbance Voltage[dBμV]	U=2.3 dB
Duty Cycle	Duty Cycle [%]	U=±2.06 %

8 Appendixes

Appendix No.	Description
SYBH(Z-RF)20220105022001-2003-A	Appendix for Bluetooth BLE

Note: We tested all modes & antennas, and the data presented in the appendix is the worst case.

END