



# FCC RF Test Report

**Product Name: Smart Phone**

**Model Number: ELE-L29/ELE-L09**

**Report No.: SYBH(Z-RF)20190117023001-2003**

**FCC ID : QISELE-LX9**

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DATE	2019-02-26	2019-02-26

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2. The Laboratory of Sporton International (Shenzhen) Inc has passed the accreditation by National Voluntary Laboratory Accreditation Program (NVLAP). The NVLAP LAB CODE is 600156-0.
3. The Reliability Laboratory of Huawei Technologies Co., Ltd 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.
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### MODIFICATION RECORD

No.	Report No	Modification Description
1	SYBH(Z-RF)20181114019001-2 003	First release.
2	SYBH(Z-RF)20190117023001-2 003	<p>(1) Updated the version of the board, and added some tests according to differences and modifications of the new version, please see General Description for details:</p> <p>_____</p> <p>Note 1: <input type="checkbox"/> The history report(s) should be withdrawn;  <input checked="" type="checkbox"/> The history report(s) are still valid.</p>

### DECLARATION

Type	Description
Multiple Models Applications	<p><input type="checkbox"/> The present report applies to single model.</p> <p><input checked="" type="checkbox"/> The present report applies to several models. The practical measurements are performed with the model <u>ELE-L29</u>.</p> <p>These models utilize the similar radio design, shielding, interface, physical layout and so on. The differences and modifications between these models are declared by the applicant and showed in General Description</p> <p>All others between these models are identical.</p> <p>The present report only presents the worst test case of all modes, see relevant test results for detailed.</p>

## 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 .....	10
4.3	Technical Description .....	12
5	General Test Conditions / Configurations .....	13
5.1	EUT Configurations .....	13
5.2	Test Setups .....	14
5.3	Test Conditions .....	17
6	Main Test Instruments .....	19
6.1	History Test Project/Report .....	19
6.2	Current Test Project/Report .....	19
7	Measurement Uncertainty .....	21
8	Appendixes .....	21

## 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 v05r01 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:	20 to 85 %		
Atmospheric Pressure:	Not applicable		
Power supply :	VL	3.6	V
	VN	3.82	V DC by Battery
	VH	4.35	V

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 Sci. &Tech. Industry Park, Dongguan, Guangdong, P.R.C
Sub-contracted Test Location 1 :	Sporton International (Shenzhen) Inc.
Address of Sub-contracted Test Location 1 :	No.3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.China

## 2.4 Applicant and Manufacturer

Company Name :	HUAWEI TECHNOLOGIES CO., LTD
Address :	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

## 2.5 Application details

Date of Receipt Sample:	2019-01-30
Start of test:	2019-02-01
End of test:	2019-02-26

## 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	Refer to No. SYBH(Z-RF)2018111 4019001-2003	Test Location 1
Occupied Bandwidth	---	No limit.	Appendix B	Refer to No. SYBH(Z-RF)2018111 4019001-2003	Test Location 1
Duty Cycle	KDB 558074 D01 (6.0)	No limit.	Appendix C	Refer to No. SYBH(Z-RF)2018111 4019001-2003	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	Refer to No. SYBH(Z-RF)2018111 4019001-2003	Test Location 1
Maximum Power Spectral Density Level	15.247(e)	Conducted < 8 dBm/3 kHz.	Appendix E	Refer to No. SYBH(Z-RF)2018111 4019001-2003	Test Location 1
Band Edges Compliance	15.247(d)	< -20 dBm/100 kHz if total peak power ≤ power	Appendix F	Refer to No. SYBH(Z-RF)2018111 4019001-2003	Test Location 1

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
Unwanted Emissions into Non-Restricted Frequency Bands		limit.	Appendix G	Refer to No. SYBH(Z-RF)2018111 4019001-2003	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	Sub-contracted Test Location 1(Before change)& Test Location 1(After change)
AC Power Line Conducted Emissions	15.207	FCC Part 15.207 conducted limit;	Appendix I	Pass	Test Location 1
<p>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.</p> <p>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</p> <p>Note3: For adding Wireless charging protective case we do not test Bluetooth BLE except RSE (worst case) and AC Power Line Conducted Emissions, and the data is not worsen, So all other data can refer to No. SYBH(Z-RF)20181114019001-2003 of before change of ELE-L29/ELE-L09.</p>					

## 4 Description of the Equipment under Test (EUT)

### 4.1 General Description

ELE-L29/ELE-L09 is subscriber equipment in the GSM/WCDMA/LTE system. The GSM frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The UMTS frequency band is B1 and B2 and B4 and B5 and B6 and B8 and B19. The ELE-L29/ELE-L09 LTE frequency band is B1 and B2 and B3 and B4 and B5 and B6 and B7 and B8 and B9 and B12 and B17 and B18 and B19 and B20 and B26 and B28 and B32 and B34 and B38 and B39 and B41. The ELE-L29 LTE frequency band for intra-band carrier aggregation uplink operation band is CA\_1C and CA\_2C and CA\_3C and CA\_7C and CA\_38C and CA\_39C and CA\_41C. The Mobile Phone implements such functions as RF signal receiving/transmitting LTE/HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS and WIFI etc. Externally it provides one micro SD card interface (it can also used as SIM card interface), earphone port (to provide voice service) and one SIM card interface. ELE-L29 is dual SIM smart phone. ELE-L09 is 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.

The mobile phone ELE-L29/ELE-L09 is LTE/UMTS/GSM mobile phone with Bluetooth. The differences between before change of ELE-L29/ELE-L09 and after change of ELE-L29/ELE-L09 are showed in the following table.

	Before change of ELE-L29/ELE-L09	After change of ELE-L29/ELE-L09
GSM four bands	B2/B3/B5/B8	B2/B3/B5/B8
WCDMA bands	B1/2/4/5/6/8/19	B1/2/4/5/6/8/19
LTE bands	FDD LTE: B1/2/3/4/5/6/7/8/9/12/17/18/19/20/ B26/28/32 TDD LTE: B34/B38/39/40/41(120M,2535-2655)	FDD LTE: B1/2/3/4/5/6/7/8/9/12/17/18/19/20/ B26/28/32 TDD LTE: B34/B38/39/40/41(120M,2535-2655)
SIM card	the same	the same
NFC	the same	the same
External camera	the same	the same



internal camera	the same	the same
FLASH	the same	the same
Mainboard	the same	the same
PCB layout	the same	the same
Appearance	the same	the same
Bluetooth mode	the same	the same
WLAN mode	the same	the same
BT/ WLAN antenna	the same	the same
GSM/ WCDMA /LTE antenna	the same	The same
Adapter	the same	the same
Battery	the same	the same
Optional accessories	None	Wireless charging protective case
Chipset	the same	the same
Memory	the same	the same
RF Parameter	The same RF Parameter in the same band	The same RF Parameter in the same band
Dimension	the same	the same
Main Frequency NV	The same NV in the same band	The same NV in the same band

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

Note2: For adding Wireless charging protective case we do not test Bluetooth BLE except RSE (worst case) and AC Power Line Conducted Emissions, and the data is not worsen, So all other data can refer to No. SYBH(Z-RF)20181114019001-2003 of before change of ELE-L29/ELE-L09.

## 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	Software Version	Hardware Version
Main Board	5.0.1.78 (C432E78R1P6log)	HL1ELLEM

### 4.2.2 Sub- Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-050450B00	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V <b>▬▬▬</b> 2A OR4.5V <b>▬▬▬</b> 5A OR 5V <b>▬▬▬</b> 4.5A
Adapter	HW-050450E00	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V <b>▬▬▬</b> 2A OR4.5V <b>▬▬▬</b> 5A OR 5V <b>▬▬▬</b> 4.5A
Adapter	HW-050450U00	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V <b>▬▬▬</b> 2A OR4.5V <b>▬▬▬</b> 5A OR 5V <b>▬▬▬</b> 4.5A
Adapter	HW-050450A00	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V <b>▬▬▬</b> 2A OR4.5V <b>▬▬▬</b> 5A OR 5V <b>▬▬▬</b> 4.5A
Adapter	HW-050450E01	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V <b>▬▬▬</b> 2A OR4.5V <b>▬▬▬</b> 5A OR 5V <b>▬▬▬</b> 4.5A
Adapter	HW-050450A01	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V <b>▬▬▬</b> 2A OR4.5V <b>▬▬▬</b> 5A OR 5V <b>▬▬▬</b> 4.5A
Li-ion Polymer Battery	HB436380ECW	Huawei Technologies Co.,Ltd.	Rated capacity: 3550mAh Nominal Voltage: +3.85V Charging Voltage: +4.43V

### 4.2.3 Wireless charging case

Wireless charging case	C-ELE Wireless charging case
Manufacturer	Huawei Technologies Co., Ltd.
Wireless charging power	10W max
Connector rating	5A max
Rated operating voltage	9V
Charging efficiency	>75%
Operating temperature	-10 °C~40 °C
Storage temperature	-40 °C~70°C

### 4.3 Technical Description

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

Characteristics	Description	
TX/RX Operating Range	2400-2483.5 MHz band	$fc = 2402 \text{ MHz} + N * 2 \text{ MHz}$ , where: - $fc$ = “Operating Frequency” in MHz, - $N$ = “Channel Number” with the range from 0 to 39.
Modulation Type	Digital	GFSK,
Emission Designator	GFSK for BT 4.2: 1M03FXD; GFSK for BT 5.0: 2M07FXD	
Bluetooth Power Class	Class 1	
Antenna	Description	Isotropic Antenna
	Type	<input checked="" type="checkbox"/> Integral <input type="checkbox"/> External <input type="checkbox"/> Dedicated
	Ports	<input checked="" type="checkbox"/> Ant 1, <input type="checkbox"/> Ant 2, <input type="checkbox"/> Ant 3
	Gain	-2.56dBi (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	<input type="checkbox"/> External DC mains, <input checked="" type="checkbox"/> Battery, <input type="checkbox"/> AC/DC Adapter, <input type="checkbox"/> Powered over Ethernet (PoE). <input type="checkbox"/> 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.

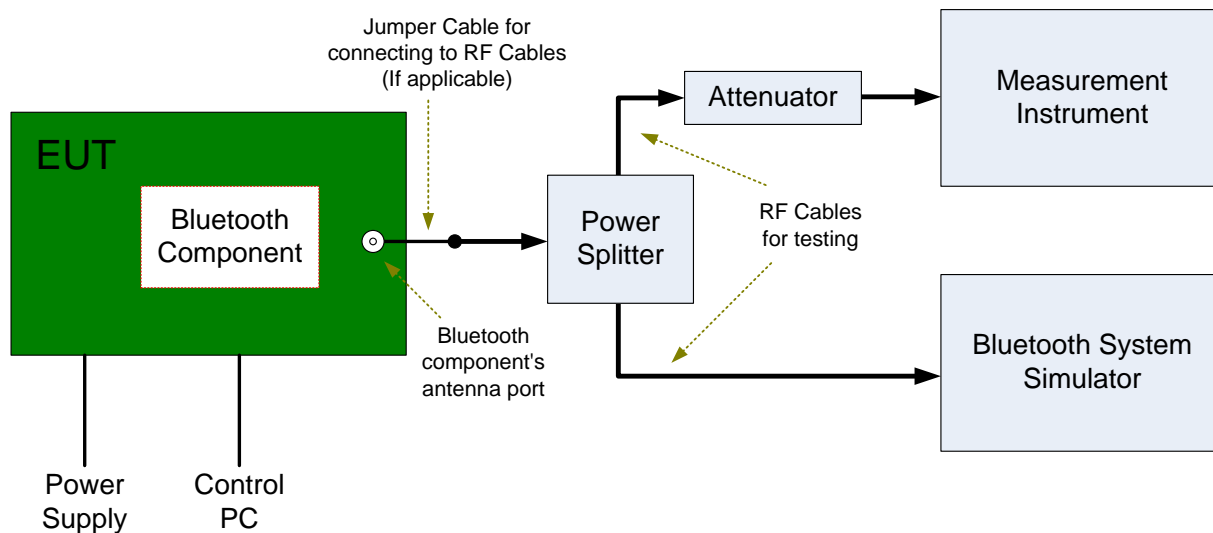
#### 5.1.2 Customized Configurations

# EUT Conf.	Signal Description	Operating Frequency	Duty cycle
TM1_Ch0	GFSK for BT 4.2 modulation, package type DH5, hopping off.	Ch No. 0 / 2402 MHz	60.8%
TM1_Ch19	GFSK for BT 4.2 modulation, package type DH5, hopping off.	Ch No. 19 / 2440 MHz	60.70%
TM1_Ch39	GFSK for BT 4.2 modulation, package type DH5, hopping off.	Ch No. 39 / 2480 MHz	60.8%
TM2_Ch0	GFSK for BT 5.0 modulation, package type DH5, hopping off.	Ch No. 0 / 2402 MHz	56.90%
TM2_Ch19	GFSK for BT 5.0 modulation, package type DH5, hopping off.	Ch No. 19 / 2440 MHz	56.90%
TM2_Ch39	GFSK for BT 5.0 modulation, package type DH5, hopping off.	Ch No. 39 / 2480 MHz	56.93%

## 5.2 Test Setups

### 5.2.1 Test Setup 1

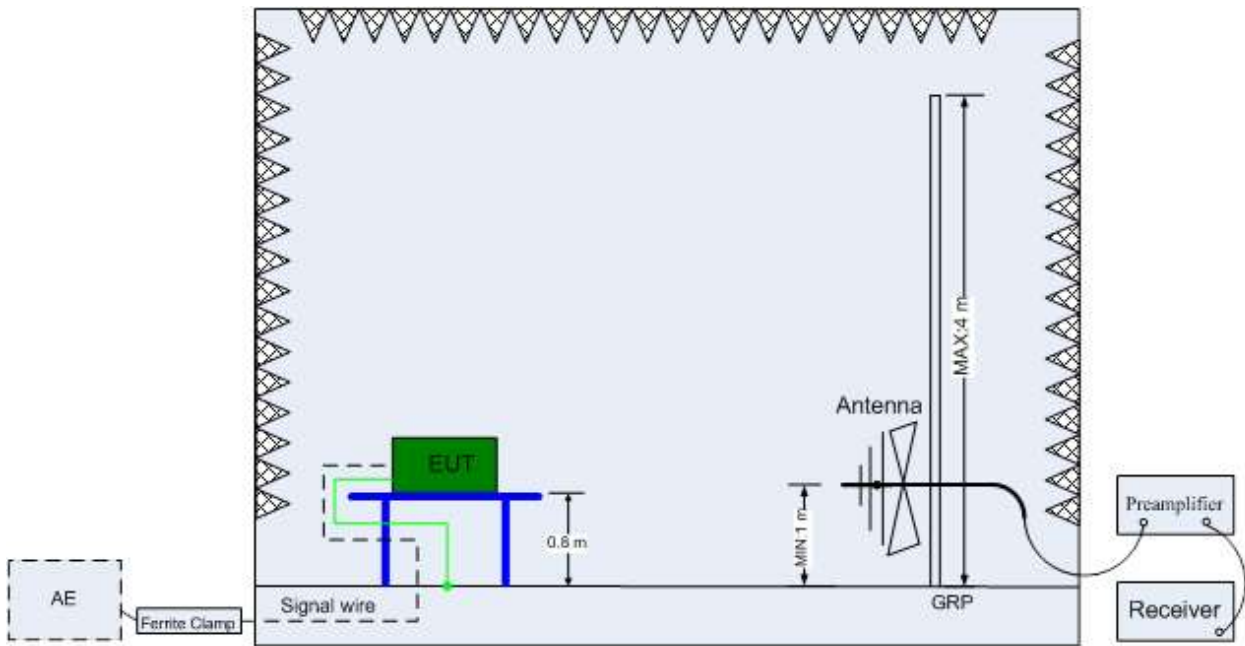
The Bluetooth component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by Bluetooth System Simulator and/or PC/software to emit the specified signals for the purpose of measurements.



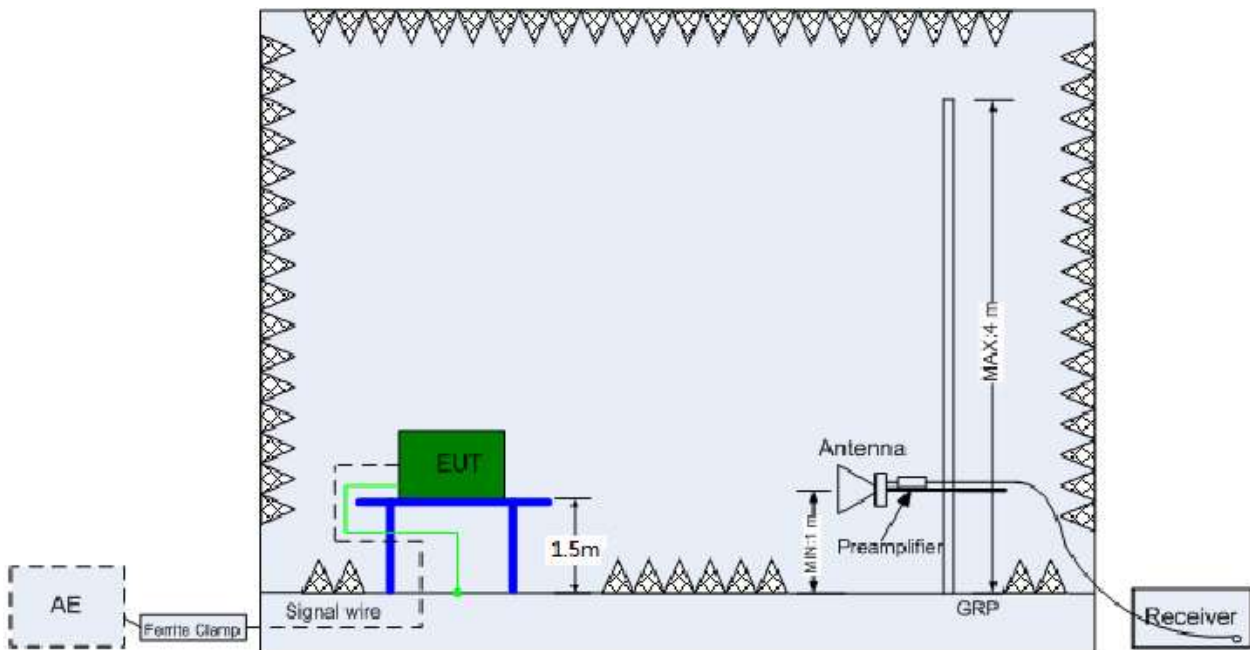
### 5.2.2 Test Setup 2

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).



(Below 1 GHz)

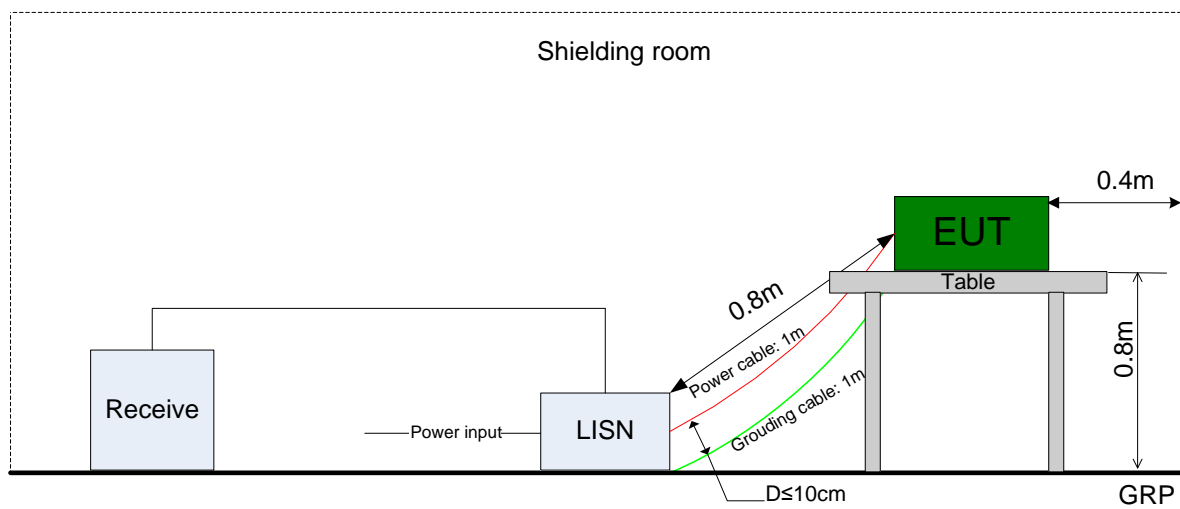


(Above 1 GHz)

### 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 2.		
	Test Env.	TN/VN		
	Test Setup	Test Setup 1		
	EUT Conf.	TM1_Ch0, TM1_Ch19, TM1_Ch39. TM2_Ch0, TM2_Ch19, TM2_Ch39.		
Occupied Bandwidth	Meas. Method	FCC KDB 558074 D01 §8.2 Option 2.		
	Test Env.	TN/VN		
	Test Setup	Test Setup 1		
	EUT Conf.	TM1_Ch0, TM1_Ch19, TM1_Ch39. TM2_Ch0, TM2_Ch19, TM2_Ch39.		
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.	TM1_Ch0, TM1_Ch19, TM1_Ch39. TM2_Ch0, TM2_Ch19, TM2_Ch39.		
Maximum Power Spectral Density Level	Meas. Method	FCC KDB 558074 D01 §8.4		
	Test Env.	TN/VN		
	Test Setup	Test Setup 1		
	EUT Conf.	TM1_Ch0, TM1_Ch19, TM1_Ch39. TM2_Ch0, TM2_Ch19, TM2_Ch39.		
Band edge spurious emission	Meas. Method	FCC KDB 558074 D01§8.7		
	Test Env.	TN/VN		
	Test Setup	Test Setup 1		
	EUT Conf.	TM1_Ch0, TM1_Ch39. TM2_Ch0, TM2_Ch39.		
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.	TM1_Ch0, TM1_Ch19, TM1_Ch39. TM2_Ch0, TM2_Ch19, TM2_Ch39.		
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.	30 MHz -1 GHz	TM1_Ch0 (Worst Conf.). TM2_Ch0 (Worst Conf.).	
		1-3 GHz	TM1_Ch0, TM2_Ch39. TM2_Ch0, TM2_Ch39.	
3-18 GHz		TM1_Ch19 (Worst Conf.), TM2_Ch19 (Worst Conf.),		
18-26.5 GHz		TM1_Ch0 (Worst Conf.). TM2_Ch0 (Worst Conf.).		

Test Case	Test Conditions	
	Configuration	Description
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.	TM1_Ch39, TM2_Ch39,

## 6 Main Test Instruments

### 6.1 History Test Project/Report

Refer to No. SYBH(Z-RF)20181114019001-2003

### 6.2 Current Test Project/Report

#### 6.2.1 Test Location 1:

This table gives a complete overview of the RF measurement equipment.

Devices used during the test described are marked

<input checked="" type="checkbox"/> Main Test Equipment( RE test system)						
Marked	Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
<input checked="" type="checkbox"/>	Test receiver	R&S	ESU26	100387	2019/01/15	2020/01/14
<input checked="" type="checkbox"/>	LOOP Antennas(9kHz-30M Hz)	R&S	HFH2-Z2	100262	2017/04/25	2019/04/25
<input type="checkbox"/>	LOOP Antennas(9kHz-30M Hz)	R&S	HFH2-Z2	100263	2017/04/25	2019/04/25
<input checked="" type="checkbox"/>	Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	9163-357	2017/04/21	2019/04/20
<input type="checkbox"/>	Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	9163-520	2017/3/29	2019/3/28
<input type="checkbox"/>	Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	9163-491	2017/3/29	2019/3/28
<input type="checkbox"/>	Trilog Broadband Antenna (30M~3GHz)	SCHWARZB ECK	VULB 9163	9163-356	2018/4/9	2020/4/8
<input checked="" type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100305	2017/4/21	2019/4/20
<input type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF906	100684	2017/5/27	2019/5/26
<input type="checkbox"/>	Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF906	100683	2017/3/29	2019/3/28
<input checked="" type="checkbox"/>	Pyramidal Horn	ETS-Lindgre	3160-09	5140299	2017/07/20	2019/07/19

	Antenna(18GHz-26.5 GHz)	n				
<input type="checkbox"/>	Pyramidal Horn Antenna(18GHz-26.5 GHz)	ETS-Lindgren	3160-09	00206665	2018/4/21	2020/4/20
<input checked="" type="checkbox"/>	Pyramidal Horn Antenna(26.5GHz-40 GHz)	ETS-Lindgren	3160-10	00205695	2018/04/20	2020/04/19
<input type="checkbox"/>	Pyramidal Horn Antenna(26.5GHz-40 GHz)	ETS-Lindgren	3160-10	LM5947	2017/07/20	2019/07/19
<input checked="" type="checkbox"/>	Measurement Software	R&S	EMC32 V9.25.0	/	/	/

<input checked="" type="checkbox"/> Main Test Equipment( CE test system)						
Marked	Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
<input type="checkbox"/>	Test receiver	R&S	ESU26	100387	2019/01/15	2020/01/14
<input checked="" type="checkbox"/>	Test receiver	R&S	ESCI	101163	2019/01/15	2020/01/14
<input type="checkbox"/>	Artificial Main Network	R&S	ENV4200	100134	2018/05/08	2019/05/07
<input checked="" type="checkbox"/>	Line Impedance Stabilization Network	R&S	ENV216	100382	2018/05/08	2019/05/07
<input checked="" type="checkbox"/>	Measurement Software	R&S	EMC32 V9.25.0	/	/	/

## 7 Measurement Uncertainty

For a 95% confidence level (k = 2), 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 = 0.64 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 = 5.90 dB (30 MHz-1 GHz) U = 4.94 dB (1 GHz-18 GHz) U = 4.24 dB (18 GHz-26.5 GHz)
Frequency Stability	Frequency Accuracy [Hz]	U=41.58Hz
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)20190117023001-2003-A	Appendix for Bluetooth BLE

END