



FCC RF Test Report

Product Name: Smart Phone

Model Number: ELE-L29/ELE-L09

Report No.: SYBH(Z-RF)20190117023001-2004

FCC ID : QISELE-LX9

Authorized	APPROVED (Lab Manager)	PREPARED (Test Engineer)
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DATE	2019-02-26	2019-02-26

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MODIFICATION RECORD

No.	Report No	Modification Description
1	SYBH(Z-RF)2018111401900 1-2004	First release.
2	SYBH(Z-RF)2019011702300 1-2004	<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 The history report(s) should be withdrawn; 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>

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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 FCC KDB 662911 D01 Multiple Transmitter Output v02r01 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)201 81114019001-2 004	Test Location 1
Occupied Bandwidth	---	No limit	Appendix B	Refer to No. SYBH(Z-RF)201 81114019001-2 004	Test Location 1
Duty Cycle	KDB 558074 D01 (6.0)	No limit	Appendix C	Refer to No. SYBH(Z-RF)201 81114019001-2 004	Test Location 1
Maximum 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)201 81114019001-2 004	Test Location 1
Maximum Power Spectral Density Level	15.247(e)	Conducted < 8 dBm/3 kHz.	Appendix E	Refer to No. SYBH(Z-RF)201 81114019001-2 004	Test Location 1
Band Edges Compliance	15.247(d)	< -30 dBm/100 kHz if total average power ≤	Appendix F	Refer to No. SYBH(Z-RF)201	Test Location 1

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
		power limit.		81114019001-2004	
Unwanted Emissions into Non-Restricted Frequency Bands			Appendix G	Refer to No. SYBH(Z-RF)2018114019001-2004	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>Note 1: 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>Note 2: 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 only tested the 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)2018114019001-2004 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 2.4G WIFI test data included in this report.

Note2: For adding Wireless charging protective case we only tested the 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)20181114019001-2004 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  2A OR4.5V  5A OR 5V  4.5A
Adapter	HW-050450E00	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V  2A OR4.5V  5A OR 5V  4.5A
Adapter	HW-050450U00	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V  2A OR4.5V  5A OR 5V  4.5A
Adapter	HW-050450A00	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V  2A OR4.5V  5A OR 5V  4.5A
Adapter	HW-050450E01	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V  2A OR4.5V  5A OR 5V  4.5A
Adapter	HW-050450A01	Huawei Technologies Co.,Ltd.	Input Voltage:100V-240V~50/60Hz, 0.75A Output Voltage: 5V  2A OR4.5V  5A OR 5V  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	
IEEE 802.11 WLAN Mode Supported	<input checked="" type="checkbox"/> 802.11b (20 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11g (20 MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n (20 MHz channel bandwidth), <input checked="" type="checkbox"/> 802.11n (40 MHz channel bandwidth)	
TX/RX Operating Range	2412-2462 MHz band	$fc = 2407 \text{ MHz} + N * 5 \text{ MHz}$, where: - fc = "Operating Frequency" in MHz, - N = "Channel Number" with the range from 1 to 11 for the 20 MHz channel bandwidth, or 3 to 9 for the 40 MHz channel bandwidth.
Data Rate	802.11b	1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps
	802.11g	6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, 54 Mbps
	802.11g CDD	6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, 54 Mbps
	802.11n (SISO)	MCS 0 to MCS 7
	802.11n (MIMO)	MCS 8 to MCS 15
Modulation Type	DBPSK/DQPSK/CCK (DSSS), BPSK/QPSK/16QAM/64QAM (OFDM).	
Emission Designator	11M9G7D (for 802.11b mode), 16M6G7D (for 802.11g mod), 17M6G7D (for 802.11n20 mode) 37M1G7D (for 802.11n40 mode)	
TX Power Control	<input type="checkbox"/> Supported, <input checked="" type="checkbox"/> Not Supported	
Standby Mode	<input type="checkbox"/> Supported, <input checked="" type="checkbox"/> Not Supported	
Equipment Type	<input checked="" type="checkbox"/> Stand-alone equipment, <input type="checkbox"/> Plug-in radio device, <input type="checkbox"/> Combined equipment	
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 checked="" type="checkbox"/> Ant 2, <input type="checkbox"/> Ant 3
	Smart System	<input checked="" type="checkbox"/> SISO (for 802.11b/g/n), <input checked="" type="checkbox"/> CDD (for 802.11g), 2 Tx & 2 Rx, <input checked="" type="checkbox"/> MIMO (for 802.11n), 2 Tx & 2 Rx, <input type="checkbox"/> Diversity (for 802.11b/g) : Tx & Rx
	Gain	Ant 1: -2.56dBi (per antenna port, max.) Ant 2: -7.17dBi (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.

Characteristics	Description	
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 Test Modes

NOTE: Worst cases for each IEEE 802.11 mode are selected to perform tests.

Test Mode	Test Modes Description
11B	IEEE 802.11b with data rate of 1 Mbps using SISO mode.
11G	IEEE 802.11g with data rate of 6 Mbps using SISO mode.
11G CDD	IEEE 802.11g with data rate of 6 Mbps using CDD mode.
11N20	IEEE 802.11n with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.
11N20m	IEEE 802.11n with data rate of MCS8 and bandwidth of 20 MHz using MIMO mode.
11N40	IEEE 802.11n with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.
11N40m	IEEE 802.11n with data rate of MCS8 and bandwidth of 40 MHz using MIMO mode.

5.2 EUT Configurations

5.2.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, <ul style="list-style-type: none"> - 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.

5.2.2 Customized Configurations

Test Mode	RF Ch.	TX Freq. [MHz]	Antenna Port	RX Freq. [MHz]	Ch. BW [MHz]	Power Conf., per Port	Duty cycle [%]
11B	L	Ch No. 1 / 2412 MHz	Ant1	---	20	17.5	99.94
			Ant2	---	20	17	99.94
	M	Ch No. 6 / 2437 MHz	Ant1	---	20	17.5	99.94
			Ant2	---	20	17	99.94
	H	Ch No. 11 / 2462 MHz	Ant1	---	20	17.5	99.94
			Ant2	---	20	17	99.94
11G	L	Ch No. 1 / 2412 MHz	Ant1	---	20	10	99.28
			Ant2	---	20	10	99.38
	L	Ch No. 2/ 2417 MHz	Ant1	---	20	16.5	99.28
			Ant2	---	20	16	99.38
	M	Ch No. 6 / 2437 MHz	Ant1	---	20	16.5	99.28



Test Mode	RF Ch.	TX Freq. [MHz]	Antenna Port	RX Freq. [MHz]	Ch. BW [MHz]	Power Conf., per Port	Duty cycle [%]
			Ant2	---	20	16	99.38
			Ant1	---	20	16.5	99.28
	H	Ch No. 10 / 2457 MHz	Ant2	---	20	16	99.38
			Ant1	---	20	10	99.28
	H	Ch No. 11 / 2462 MHz	Ant2	---	20	10	99.34
			Ant1	---	20	10	99.34
11G CDD	L	Ch No. 1 / 2412 MHz	Ant1	---	20	10	99.34
			Ant2	---	20	10	99.34
	L	Ch No. 2/ 2417 MHz	Ant1	---	20	16.5	99.34
			Ant2	---	20	16	99.34
	M	Ch No. 6 / 2437 MHz	Ant1	---	20	16.5	99.34
			Ant2	---	20	16	99.34
	H	Ch No. 10 / 2457 MHz	Ant1	---	20	16.5	99.34
			Ant2	---	20	16	99.34
H	Ch No. 11 / 2462 MHz	Ant1	---	20	10	99.34	
		Ant2	---	20	10	96.85	
11N20	L	Ch No. 1 / 2412 MHz	Ant1	---	20	10	99.29
			Ant2	---	20	10	99.29
	L	Ch No. 2/ 2417 MHz	Ant1	---	20	15.5	99.29
			Ant2	---	20	15	99.29
	M	Ch No. 6 / 2437 MHz	Ant1	---	20	15.5	99.29
			Ant2	---	20	15	99.29
H	Ch No. 10 / 2457 MHz	Ant1	---	20	15.5	99.29	
		Ant2	---	20	15	99.29	
H	Ch No. 11 / 2462 MHz	Ant1	---	20	10	99.29	
		Ant2	---	20	10	99.29	
11N20m	L	Ch No. 1 / 2412 MHz	Ant1	---	20	10	98.62
			Ant2	---	20	10	98.62
	L	Ch No. 2/ 2417 MHz	Ant1	---	20	15.5	98.62
			Ant2	---	20	15	98.62
	M	Ch No. 6 / 2437 MHz	Ant1	---	20	15.5	98.62
			Ant2	---	20	15	98.62
H	Ch No. 10 / 2457 MHz	Ant1	---	20	15.5	98.62	
		Ant2	---	20	15	98.62	
H	Ch No. 11 / 2462 MHz	Ant1	---	20	10	98.62	
		Ant2	---	20	10	98.62	
11N40	L	Ch No. 3 / 2422 MHz	Ant1	---	40	7.5	98.56
			Ant2	---	40	7.5	98.56
	L	Ch No. 4 / 2427 MHz	Ant1	---	40	15.5	98.56
			Ant2	---	40	15	98.56
M	Ch No. 6 / 2437 MHz	Ant1	---	40	15.5	98.56	

Test Mode	RF Ch.	TX Freq. [MHz]	Antenna Port	RX Freq. [MHz]	Ch. BW [MHz]	Power Conf., per Port	Duty cycle [%]
			Ant2	---	40	15	98.56
			Ant1	---	40	6.5	98.56
	H	Ch No. 8 / 2447MHz	Ant2	---	40	6.5	98.56
			Ant1	---	40	6.5	98.56
11N40m	L	Ch No. 3 / 2422 MHz	Ant1	---	40	7.5	97.42
			Ant2	---	40	7.5	97.42
	L	Ch No. 4 / 2427 MHz	Ant1	---	40	15.5	97.42
			Ant2	---	40	15	97.42
M	Ch No. 6 / 2437 MHz	Ant1	---	40	15.5	97.42	
		Ant2	---	40	15	97.42	
H	Ch No. 8 / 2447MHz	Ant1	---	40	6.5	98.56	
		Ant2	---	40	6.5	98.56	
H	Ch No. 9 / 2452 MHz	Ant1	---	40	6.5	97.42	
		Ant2	---	40	6.5	97.42	

5.3 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.”

The antennas of the **ELE-L29/ELE-L09** are **permanently attached**.

There are no provisions for connection to an external antenna.

Conclusion:

The **EUT FCC ID: QISELE-LX9** unit complies with the requirement of §15.203.

Ch. Frequency (MHz)

Ch.	Frequency (MHz)
01	2412
.	.
.	.
06	2437
.	.
.	.
11	2462

Frequency/ Channel Operations

5.4 Description of tests

5.4.1 Bandwidth measurement

- (a) Connect EUT test port to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power at 2.4GHz, then set the measured frequency number and test the bandwidth with spectrum analyzer.

5.4.2 Average output power

- (a) Connect EUT test port to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power at 2.4GHz.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted output power separately.

5.4.3 Band edge spurious emission

- (a) Connect EUT test port to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz.
- (c) Then set the EUT to transmit at high, low frequency and measure the conducted band edge spurious separately.

5.4.4 Conducted RF spurious

- (a) Connect EUT test port to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted spurious separately.

5.4.5 Power spectral density

- (a) Connect EUT test port to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted power spectral density.

5.4.6 Radiated spurious emission & spurious in restricted band

For frequency below 1GHz, the test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10 (2013). The EUT was set-up on insulator 80cm above the Ground Plane. For frequency above 1GHz, the test site full-anechoic chamber has met the requirement of ANSI C63.10 (2013). The EUT was set-up on insulator 150cm above the Ground Plane.

The set-up and test methods were according to ANSI C63.10:2013. The Radiated Disturbance measurements were made using a Rohde and Schwarz Test Receiver and control software.

A preliminary scan and a final scan of the emissions were made by using test script of software; the emissions were measured using a Quasi-Peak Detector below 1GHz, Peak Detector and AV Detector above 1GHz. The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna

was 1m to 4m, and the azimuth range of turntable was 0° to 360°. The receive antenna has two polarizations V and H.

A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other nonmetallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized.

The EUT communicates with the BTS simulator through Air interface. The EUT operated on the typical channel.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 kHz

Measurement bandwidth: 1000 MHz – 10th Carrier Frequency: 1 MHz

5.4.7 Conducted Emission at Power Port

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

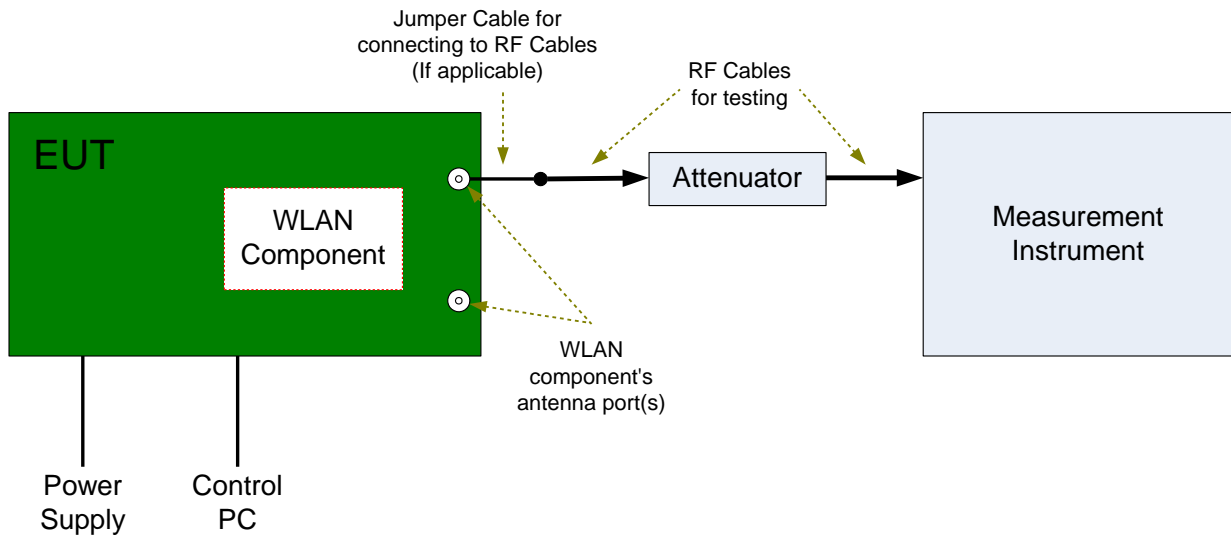
The EUT communicates with the BTS simulator through Air interface, the BTS simulator controls the Wireless Modem to transmit the maximum power which defined in specification of product. The Wireless Modem operated on the typical channel.

Measurement bandwidth (RBW) for 150 kHz to 30 MHz: 9 kHz;

5.5 Test Setups

5.5.1 Test Setup 1

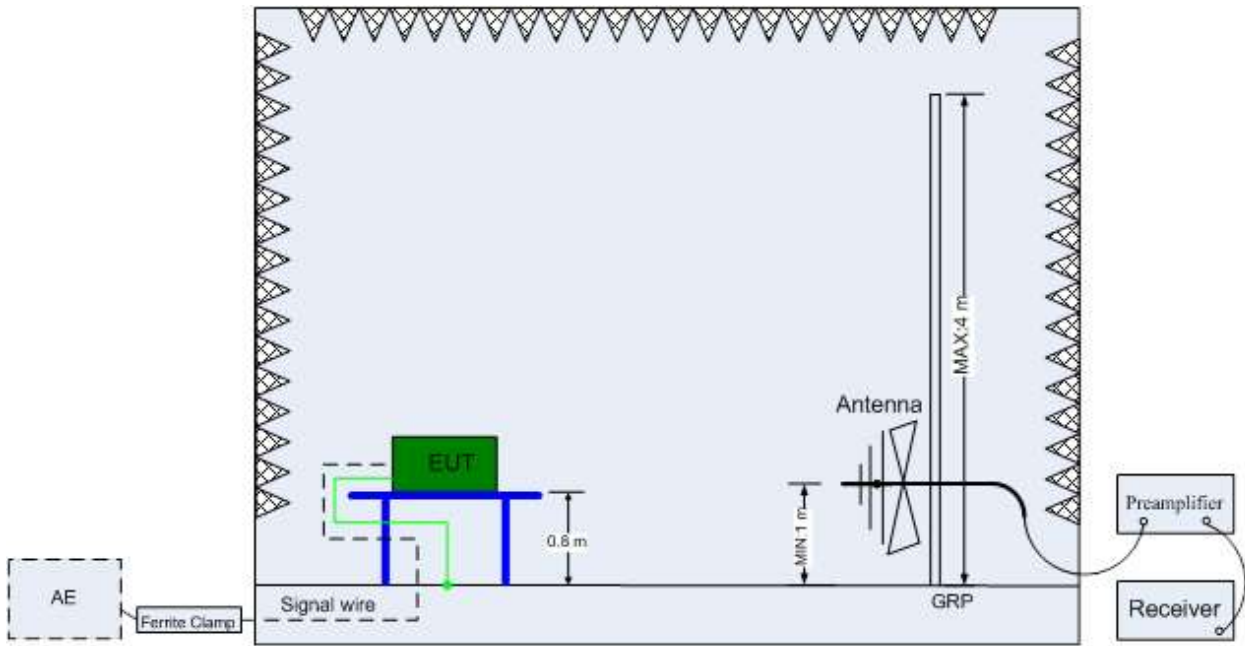
The WLAN component's antenna port(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



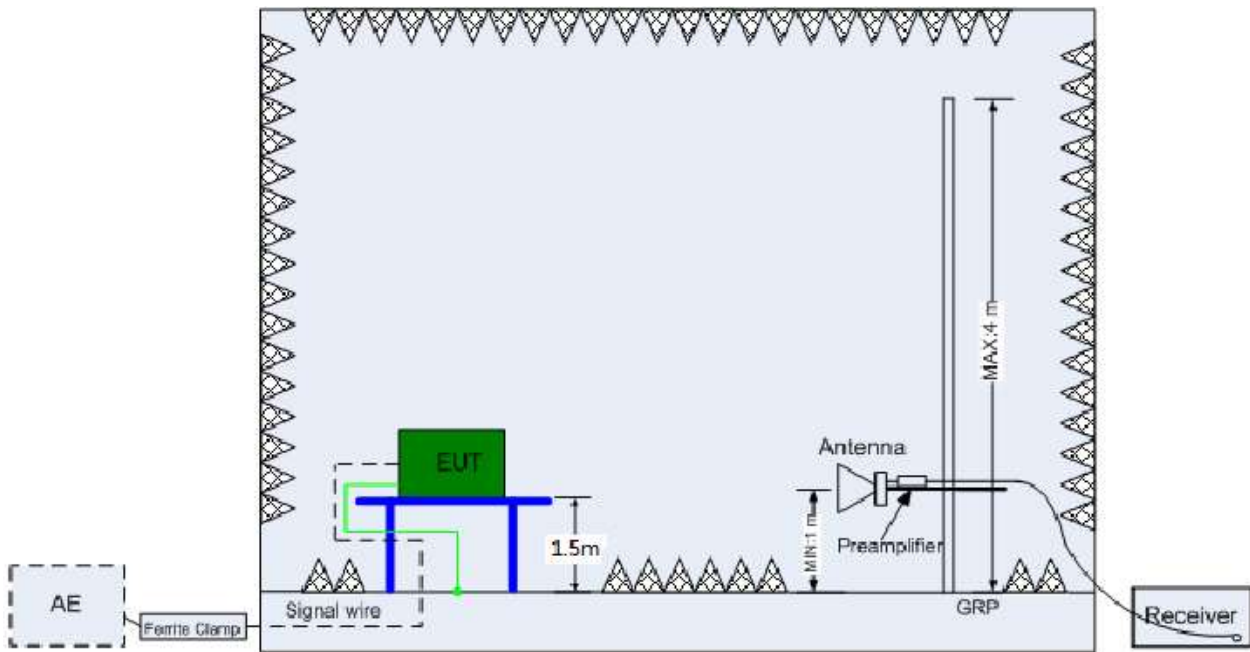
5.5.2 Test Setup 2

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)

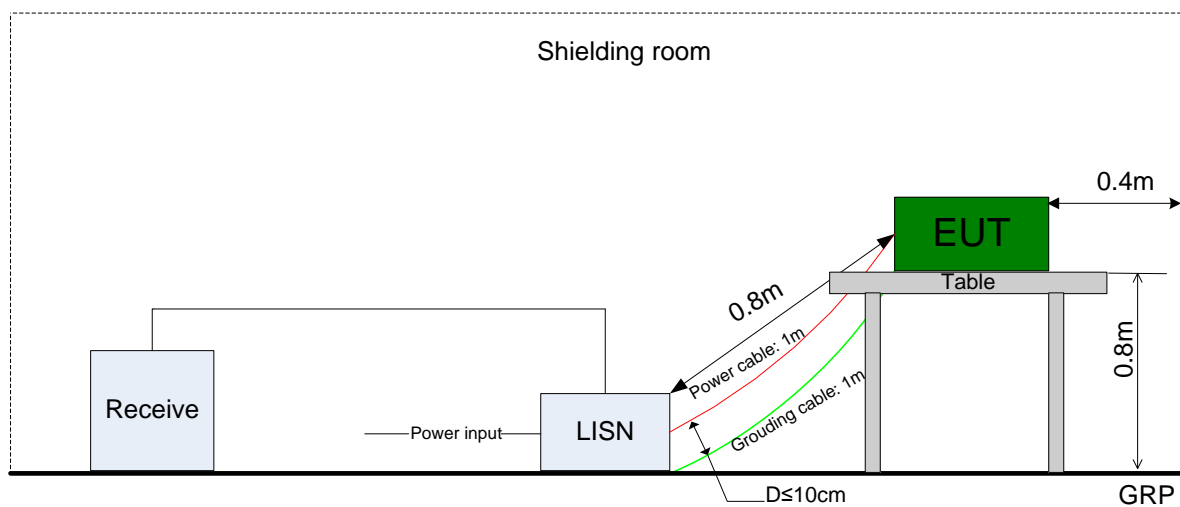


(Above 1 GHz)

5.5.3 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.



5.6 Test Conditions

Test Case	Test Conditions	
	Configuration	Description
DTS (6 dB) Bandwidth	Measurement Method	FCC KDB 558074 D01 §8.2 Option 2.
	Test Environment	TN/VN
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11G_CDD_L@Ant1, 11G_CDD_L@Ant2, 11G_CDD_M@Ant1, 11G_CDD_M@Ant2, 11G_CDD_H@Ant1, 11G_CDD_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Occupied Bandwidth	Measurement Method	FCC KDB 558074 D01 §8.2 Option 2.
	Test Environment	TN/VN
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11G_CDD_L@Ant1, 11G_CDD_L@Ant2, 11G_CDD_M@Ant1, 11G_CDD_M@Ant2, 11G_CDD_H@Ant1, 11G_CDD_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Maximum Conducted Average Output Power	Measurement Method	FCC KDB 558074 D01 §8.3.2.2
	Test Environment	TN/VN
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2,

Test Case	Test Conditions	
	Configuration	Description
		11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11G_CDD_L@Ant1, 11G_CDD_L@Ant2, 11G_CDD_M@Ant1, 11G_CDD_M@Ant2, 11G_CDD_H@Ant1, 11G_CDD_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Maximum Power Spectral Density Level	Measurement Method	FCC KDB 558074 D01 §8.4
	Test Environment	TN/VN
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11G_CDD_L@Ant1, 11G_CDD_L@Ant2, 11G_CDD_M@Ant1, 11G_CDD_M@Ant2, 11G_CDD_H@Ant1, 11G_CDD_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Band Edges Compliance	Measurement Method	FCC KDB 558074 D01 §8.7
	Test Environment	TN/VN
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11G_CDD_L@Ant1, 11G_CDD_L@Ant2, 11G_CDD_H@Ant1, 11G_CDD_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,

Test Case	Test Conditions	
	Configuration	Description
		nt2,
Unwanted Emissions into Non-Restricted Frequency Bands	Measurement Method	FCC KDB 558074 D01 §8.5
	Test Environment	TN/VN
	Test Setup	Test Setup 1
	EUT Configuration	11B_L@Ant1, 11B_L@Ant2, 11B_M@Ant1, 11B_M@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_M@Ant1, 11G_M@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11G_CDD_L@Ant1, 11G_CDD_L@Ant2, 11G_CDD_M@Ant1, 11G_CDD_M@Ant2, 11G_CDD_H@Ant1, 11G_CDD_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_M@Ant1, 11N20_M@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_M@Ant1, 11N20m_M@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_M@Ant1, 11N40_M@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_M@Ant1, 11N40m_M@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2,
Unwanted Emissions into Restricted Frequency Bands (Radiated)	Measurement Method	ANSI C63.10; FCC KDB 558074 D01 §8.6, Radiated
	Test Environment	TN/VN
	Test Setup	Test Setup 2
	EUT Placement	<input checked="" type="checkbox"/> Flatwise, <input checked="" type="checkbox"/> Upright, <input checked="" type="checkbox"/> Hung
	EUT Configuration	(1) 30 MHz to 1 GHz: 11B_L@Ant1 (Worst Conf.). (2) 1 GHz to 3 GHz: 11B_L@Ant1, 11B_L@Ant2, 11B_H@Ant1, 11B_H@Ant2, 11G_L@Ant1, 11G_L@Ant2, 11G_H@Ant1, 11G_H@Ant2, 11G_CDD_L@Ant1, 11G_CDD_L@Ant2, 11G_CDD_H@Ant1, 11G_CDD_H@Ant2, 11N20_L@Ant1, 11N20_L@Ant2, 11N20_H@Ant1, 11N20_H@Ant2, 11N20m_L@Ant1, 11N20m_L@Ant2, 11N20m_H@Ant1, 11N20m_H@Ant2, 11N40_L@Ant1, 11N40_L@Ant2, 11N40_H@Ant1, 11N40_H@Ant2, 11N40m_L@Ant1, 11N40m_L@Ant2, 11N40m_H@Ant1, 11N40m_H@Ant2, (3) 3 GHz to 18 GHz: 11B_L@Ant1 (Worse Conf.), 11B_H@Ant1 (Worse Conf.). (4) 18 GHz to 26.5 GHz: 11B_L@Ant1 (Worse Conf.), 11B_H@Ant1 (Worse Conf.).
AC Power Line Conducted	Measurement Method	AC mains conducted.
	Test Environment	TN/VN

Test Case	Test Conditions	
	Configuration	Description
Emissions	Test Setup	Test Setup 3
	EUT Configuration	11B_L@Ant1 (Worst Conf.).

6 Main Instruments

6.1 History Test Project/Report

Refer to No. SYBH(Z-RF)20181114019001-2004

6.2 Current Test Project/Report

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

Devices used during the test described are marked

6.2.1 Test Location 1:

<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 [kHz]	20MHz: U=41.78kHz 40MHz: U=82.12kHz
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[dB μ V]	U=2.3 dB
Duty Cycle	Duty Cycle [%]	U= \pm 2.06 %

8 Appendixes

Appendix No.	Description
SYBH(Z-RF)20190117023001-2004-A	Appendix_for_2.4G WLAN

END