



FCC

RF Test Report

Model Number: ELE-L29m/ELE-L09m

Report No.: SYBH(Z-RF)20190401022001-2003

FCC ID: QISELE-LX9M

Authorized	APPROVED (Lab Manager)	PREPARED (Test Engineer)
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DATE	2019-04-30	2019-04-30

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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.
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MODIFICATION RECORD

No.	Report No	Modification Description
1	SYBH(Z-RF)2019040102200 1-2003	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 <u>ELE-L29m</u>. 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 All others between these models are identical. The present report only presents the worst test case of all modes, see relevant test results for detailed.

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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 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	3.8	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 Sci. & Tech. Industry Park, Dongguan, 523808, P.R.C

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:	2019-04-15
Start of test:	2019-04-16
End of test:	2019-04-30

3 Test Summary

Test Item	FCC Rule No.	Requirements	Test Result	Verdict	Testing location
DTS (6 dB) Bandwidth	15.247(a)(2)	≥ 500 kHz.	Refer to No. SYBH(Z-RF) 20190401017001-2003	Pass	Test Location 1
Occupied Bandwidth	---	No limit.	Refer to No. SYBH(Z-RF) 20190401017001-2003	Pass	Test Location 1
Duty Cycle	KDB 558074 D01 (6.0)	No limit.	Refer to No. SYBH(Z-RF) 20190401017001-2003	Pass	Test Location 1
Maximum Peak Output Power	15.247(b)(3)	FCC: For directional gain: Conducted < 30 dBm – (G[dBi] – 6 [dB]); Otherwise: Conducted < 30 dBm,	Refer to No. SYBH(Z-RF) 20190401017001-2003	Pass	Test Location 1
Maximum Power Spectral Density Level	15.247(e)	Conducted < 8 dBm/3 kHz.	Refer to No. SYBH(Z-RF) 20190401017001-2003	Pass	Test Location 1
Band Edges Compliance	15.247(d)	< -20 dBr/100 kHz if total Peak power $\leq$ power limit.	Refer to No. SYBH(Z-RF) 20190401017001-2003	Pass	Test Location 1
Unwanted Emissions into Non-Restricted Frequency Bands			Refer to No. SYBH(Z-RF) 20190401017001-2003	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;	Refer to No. SYBH(Z-RF) 20190401017001-2003	Pass	Test Location 1
AC Power Line Conducted Emissions	15.207	FCC Part 15.207 conducted limit;	Refer to No. SYBH(Z-RF) 20190401017001-2003	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

ELE-L29m/ELE-L09m 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-L29m/ELE-L09m 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-L29m 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-L29m is dual SIM smart phone. ELE-L09m 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 difference between model **ELE-L04m** and model **ELE -L29m** is show in the below table:

	Model	ELE-L04m	ELE-L29m
Licensed Frequency	LTE BAND	FCC Band: B2/B4/ B5/B7/B12/B17/B26/B38/ B41(2535~2655MHz)/B66	FCC Band: B2/B4/ B5/B7/B12/B17/B26/B38/ B41(2535~2655MHz)
	UMTS BAND	the same	the same
	GSM	the same	the same
	IC	the same	the same
	Antenna	the same	the same
	NFC	the same	the same
Unlicensed Frequency	Bluetooth	the same	the same
	2.4G Wi-Fi	the same	the same
	5.8G Wi-Fi	the same	the same
	IC	the same	the same
	Antenna	the same	the same
Hardware	Ram / Rom	the same	the same
	Camera	the same	the same
	PCB	the same	the same
	USB Port	the same	the same
	SIM	one	two
	Hardware version	the same	the same
RF	RF circuit	The hardware channel of WCDMA B4 and LTE B2/4/7(include CA band) is different, Irrelevant to other frequency bands	The hardware channel of WCDMA B4 and LTE B2/4/7(include CA band) is different, Irrelevant to other frequency bands

Appearance	Dimension	the same	the same
	Color	different	different
Accessory	Battery	the same	the same
	External Charger	the same	the same
	USB label	the same	the same
	Earphone	the same	the same

Note1: Based on HW knowledge of the device design, we do not test Bluetooth BLE of ELE-L29m/ELE-L09m, all test data can refer to No. SYBH(Z-RF)20190401017001-2003 of ELE-L04m(FCC ID: QISELE-L04M).

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	5.0.1.130 (SP2C432E131R1P11)	HL3ELLEM

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 OR 4.5V  5A OR 5V  4.5A
Adapter	HW-050450E00	Huawei Technologies Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V  2A OR 4.5V  5A OR 5V  4.5A
Adapter	HW-050450U00	Huawei Technologies Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V  2A OR 4.5V  5A OR 5V  4.5A
Adapter	HW-050450A00	Huawei Technologies Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V  2A OR 4.5V  5A OR 5V  4.5A
Adapter	HW-050450E01	Huawei Technologies Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V  2A OR 4.5V  5A OR 5V  4.5A
Adapter	HW-050450A01	Huawei Technologies Co., Ltd.	Input voltage: 100V-240V~50/60Hz, 0.75A Output voltage: 5V  2A OR 4.5V

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
			=== 5A OR 5V === 4.5A
Battery	HB436380ECW	Huawei Technologies Co., Ltd.	Rated capacity: 3550mAh mAh 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/manufacture's specifications or user manual.

Characteristics	Description	
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 BT 4.2: 1M03FXD GFSK for BT 5.0: 2M07FXD	
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	-2.56 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

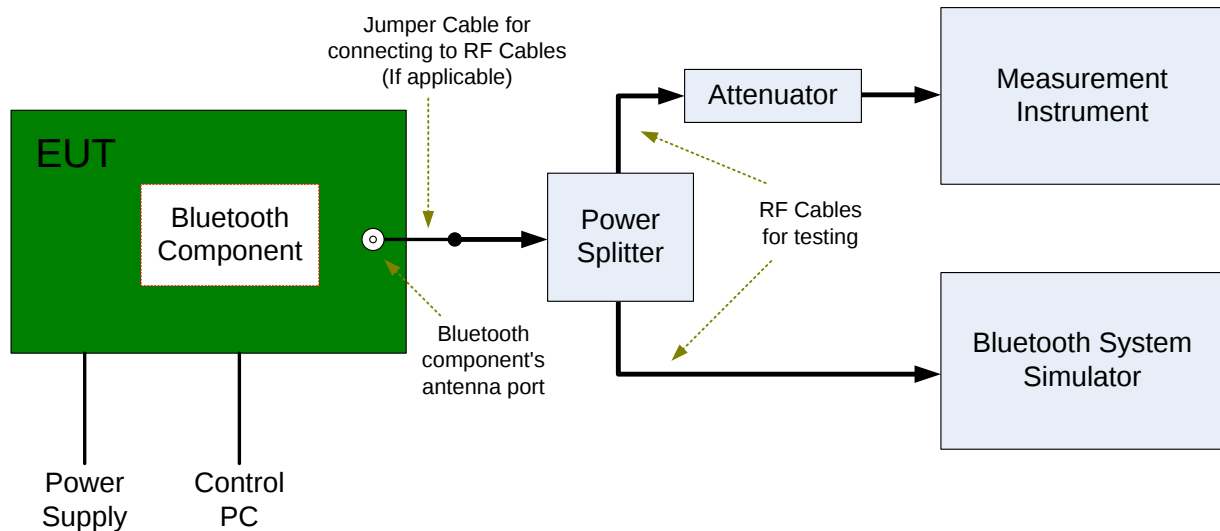
5.1.2 Customized Configurations

# EUT Conf.	Signal Description	Operating Frequency	Duty cycle[%]
TM1_Ch0	GFSK for BT 4.2 modulation, package type DH5, hopping off.	Ch No. 0 / 2402 MHz	60.70
TM1_Ch19	GFSK for BT 4.2 modulation, package type DH5, hopping off.	Ch No. 19 / 2440 MHz	60.80
TM1_Ch39	GFSK for BT 4.2 modulation, package type DH5, hopping off.	Ch No. 39 / 2480 MHz	60.80
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	56.90

5.2 Test Setups

5.2.1 Test Setup 1

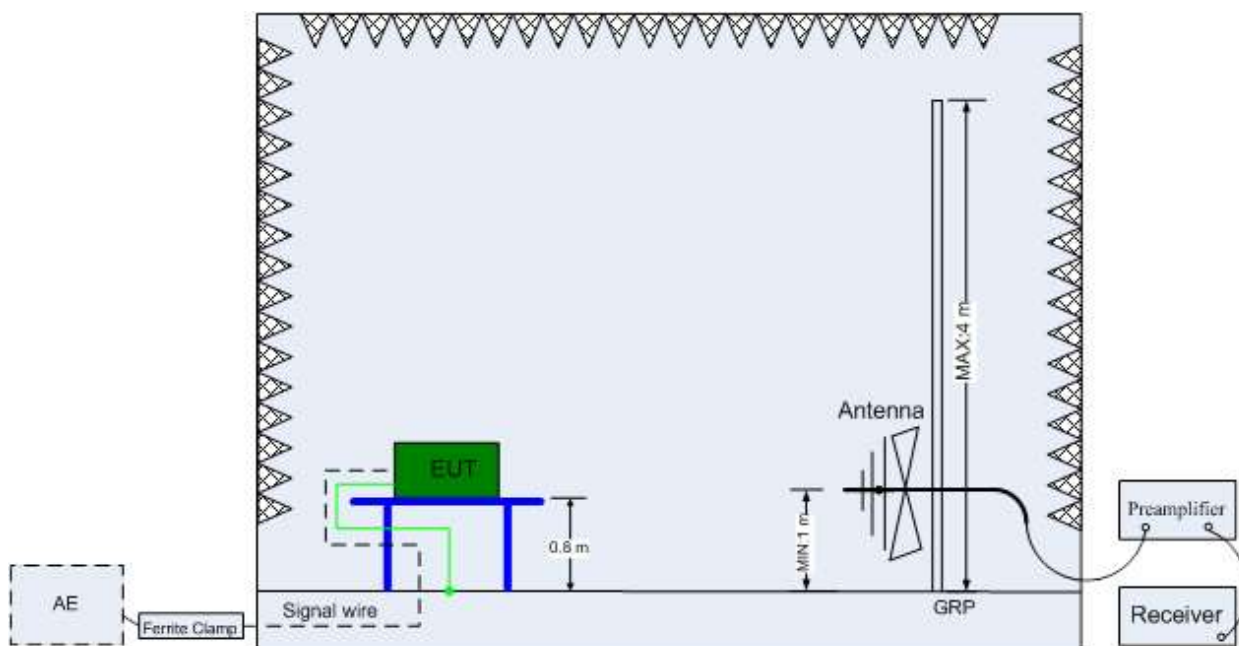
The Bluetooth component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by Bluetooth System Simulator and/or PC/software to emit the specified signals for the purpose of measurements.



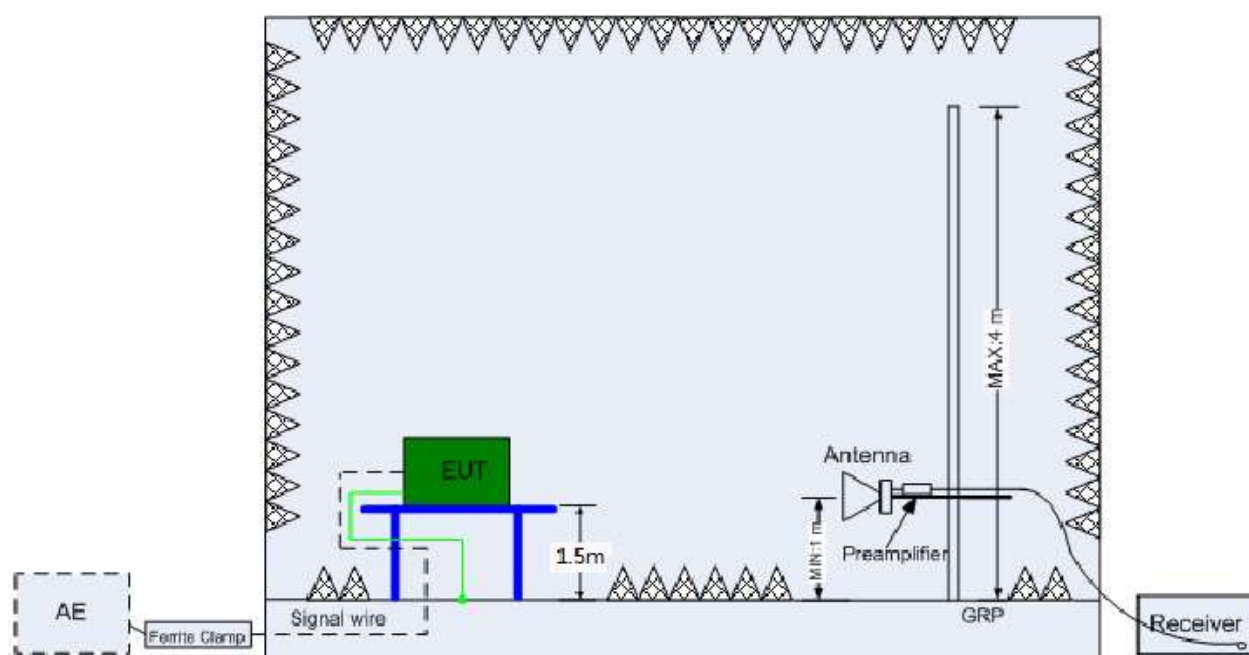
5.2.2 Test Setup 2

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)

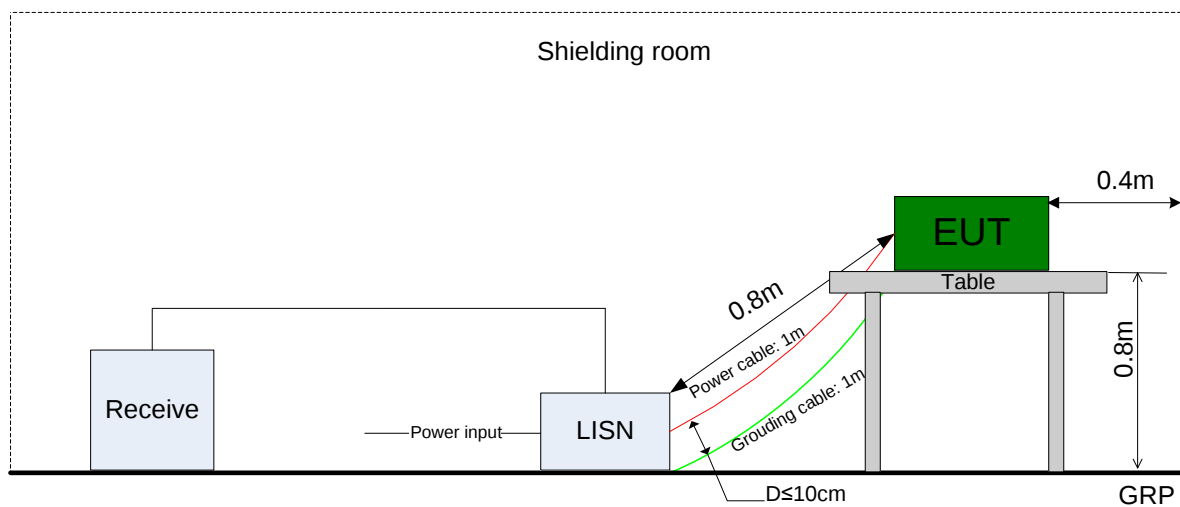


(Above 1 GHz)

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, TM1_Ch19, TM1_Ch39, TM2_Ch0, TM2_Ch19, TM2_Ch39.
		3-18 GHz	TM1_Ch19 (Worst Conf.),

Test Case	Test Conditions		
	Configuration	Description	
			TM2_Ch19 (Worst Conf.),
		18-26.5 GHz	TM1_Ch0 (Worst Conf.), TM2_Ch0 (Worst Conf.).
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_Ch0 TM2_Ch0	

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	2018/05/30	2019/05/30
Spectrum Analyzer	Agilent	N9030A	MY51380032	2018/07/23	2019/07/23

Main Test Equipment(RE test system)					
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
Test receiver	R&S	ESU26	100387	2019/01/15	2020/01/14
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100263	2019/03/15	2021/03/15
Trilog Broadband Antenna (30M~3GHz)	SCHWARZ BECK	VULB 9163	9163-356	2018/4/9	2020/4/8
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF906	100684	2017/5/27	2019/5/26
Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	3160-09	5140299	2017/07/20	2019/07/19
Pyramidal Horn Antenna(26.5GHz-40GHz)	ETS-Lindgren	3160-10	00205695	2018/04/20	2020/04/19
Software Information					
Test Item	Software Name		Manufacturer		Version
RE	EMC32		R&S		V9.25.0

Main Test Equipment(CE test system)					
Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal-Due
Test receiver	R&S	ESU26	100387	2019/01/15	2020/01/14
Artificial Main Network	R&S	ENV4200	100134	2018/05/08	2019/05/07
Line Impedance Stabilization Network	R&S	ENV216	100382	2018/05/08	2019/05/07
Software Information					
Test Item	Software Name		Manufacturer		Version
CE	EMC32		R&S		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 = 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)
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 %

END