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TESTING
CNAS L0310



TESTING CERT #2174.01

FCC RF Test Report

Product Name: Smart Phone

Model Number: EVA-L09

Report No: SYBH(Z-RF)013122015-2005

FCC ID: QISEVA-L09

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang
District, Shenzhen, 518129, P.R.C

Tel: +86 755 28780808

Fax: +86 755 89652518

Notice

1. The laboratory has Passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has Passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 97456.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-1.
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. The laboratory has Passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
10. The laboratory (Reliability Lab of Huawei Technologies Co., Ltd) is also named as “Global Compliance and Testing Center of Huawei Technologies Co., Ltd”, the both names have coexisted since 2009.



Applicant: Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129, P.R.C

Date of Receipt Sample: 2015-12-14
Start Date of Test: 2015-12-15
End Date of Test: 2016-02-05

Test Result: Pass

Approved by Senior Engineer:	2016-02-19	Liu Chunlin	
	Date	Name	Signature

Prepared by:	2015-02-18	maowenli	
	Date	Name	Signature

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1 General Information

1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2, Subpart J 2014
47 CFR FCC Part 15, Subpart C 2014
47 CFR FCC Part 15, Subpart E 2014

Test Method: KDB 789033 D02 General UNII Test Procedures New Rules v01
FCC KDB 558074 D01 DTS Meas Guidance v03r02
ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices

1.2 Test Location

Test Location 1: Reliability Laboratory of Huawei Technologies Co., Ltd.
Address: Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Test Environment Condition

Temperature: 15 to 30 °C (Ambient)
Relative Humidity: 20 to 85 % (Ambient)
Atmospheric Pressure: Not applicable

2 Test Summary

2.1 Measurement Technical Requirements

2.1.1 U-NII (5150-5250, 5250-5350, 5470-5725 MHz,5725-5850)

Test Item	Band	FCC Rule	Requirements	Test Result	Verdict
Emission Bandwidth	5150-5250	15.403(i) 15.407(a)(1)	No limit.	Appendix A	Pass
	5250-5350	15.403(i) 15.407(a)(2)			
	5470-5725	15.403(i) 15.407(a)(2)			
	5725-5850	15.403(i) 15.407(e)	≥ 500 kHz.		
Maximum Conducted Output Power	5150-5250	15.407(a)(1) 15.407(a)(4)	< 250mW (avg during transmission)	Appendix B	Pass
	5250-5350	15.407(a)(2) 15.407(a)(4)	<MIN{250mW,11dBm+10*Ig(E BW)} (avg during transmission)		
	5470-5725	15.407(a)(2) 15.407(a)(4)	<MIN{250mW,11dBm+10*Ig(E BW)} (avg during transmission)		
	5725-5850	15.407(a)(3)	< 1W (avg during transmission)		
Duty Cycle	5150-5250	15.407(a)(1) 15.407(a)(4)	No limit.	Appendix C	
	5250-5350	15.407(a)(2) 15.407(a)(4)			
	5470-5725	15.407(a)(2) 15.407(a)(4)			
	5725-5850	15.407(a)(3)			
Peak Power Spectral Density	5150-5250	15.407(a)(1) 15.407(a)(4)	<11dBm/MHz (avg during transmission)	Appendix D	
	5250-5350	15.407(a)(2) 15.407(a)(4)	<11dBm/MHz (avg during transmission)		
	5470-5725	15.407(a)(2) 15.407(a)(4)	<11dBm/MHz (avg during transmission)		
	5725-5850	15.407(a)(3) 15.407(a)(4)	<30dBm/500KHz (avg during transmission)		
Unwanted	5150-5250	15.407(b)(1)	● F<1GHz:	Appendix E	Pass

Test Item	Band	FCC Rule	Requirements	Test Result	Verdict
Emissions		15.407(b)(6) 15.407(b)(7) 15.209	§15.209/§7.2.5 limit (QP). ● F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.15-5.35 GHz). ● F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
	5250-5350	15.407(b)(2) 15.407(b)(6) 15.407(b)(7) 15.209	● F<1GHz: §15.209/§7.2.5 limit (QP). ● F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.25-5.35 GHz). ● F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
	5470-5725	15.407(b)(3) 15.407(b)(6) 15.407(b)(7) 15.209	● F<1GHz: §15.209/§7.2.5 limit (QP). ● F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.47-5.725 GHz). ● F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		
	5725-5850	15.407(b)(4) 15.407(b)(6) 15.407(b)(7) 15.209	● F<1GHz: §15.209/§7.2.5 limit (QP) ● F≥1GHz & out-restricted: <-17dBm/MHz PK e.i.r.p.(from the edge to 10 MHz above or below the band edge); <-27dBm/MHz PK e.i.r.p(for frequencies 10 MHz or greater above or below the band edge) (exl. 5725-5850 GHz). ● F≥1GHz & in-restricted: §15.209/§7.2.5 limit (AV&PK).		

Test Item	Band	FCC Rule	Requirements	Test Result	Verdict
Frequency Stability	5150-5250 5250-5350 5470-5725 5725-5850	15.407(g)	FCC Part 15.407(g)	Appendix F	Pass

3 Description of the Equipment under Test (EUT)

3.1 General Description

EVA-L09 is subscriber equipment in the LTE/WCDMA /GSM system. The LTE frequency band is Band I,Band II,Band III,Band IV,Band V, Band VI ,Band VII,Band VIII, Band XII,BandXVII, Band XVIII ,Band XIX, Band XX, Band XXVI, Band XXVIII ,Band XXXVIII,BandXXXIX, Band XL and Band XLI. The HSUPA/HSDPA/UMTS frequency band is Band I, Band II, Band IV, Band V, Band VI, Band VIII and Band XIX, The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/ WCDMA /GSM protocol processing, voice, video, MMS service, GPS, AGPS,NFC and WIFI etc. Externally it provides earphone port (to provide voice service) and USIM card interface. 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

NOTE:

Only 5G WLAN test data included in this report

3.2 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.

3.2.1 Board

Board		
Software Version	Hardware Version	Description
Main Board	HL1LEVAM	A168-L09C900B071

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Adapter	HW-050200U01	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.5A Output Voltage: 5V  2A Rated Power: 10W
Adapter	HW-050200E01	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.5A Output Voltage: 5V  2A Rated Power: 10W
Adapter	HW-050200B01	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.5A Output Voltage: 5V  2A Rated Power: 10W
Adapter	HW-050200A01	Huawei Technologies Co., Ltd.	Input Voltage: ~100-240V 50/60Hz 0.5A Output Voltage: 5V  2A Rated Power: 10W
Battery	HB366481ECW	Huawei Technologies Co., Ltd.	Rated capacity: 2900mAh Nominal Voltage:  +3.82V Charging Voltage:  +4.4V

3.3 Technical Description

Characteristics	Description	
IEEE 802.11 WLAN Mode Supported	☒ 802.11a (20 MHz channel bandwidth), ☒ 802.11n (20 MHz channel bandwidth), ☒ 802.11n (40 MHz channel bandwidth), ☒ 802.11ac (20 MHz channel bandwidth), ☒ 802.11ac (40 MHz channel bandwidth), ☒ 802.11ac (80 MHz channel bandwidth),	
TX/RX Operating Range	All	$f_c = 5000 \text{ MHz} + N * 5 \text{ MHz}$, where: - f_c = "Operating Frequency" in MHz, - N = "Channel Number".
	5150-5250 MHz (U-NII)	$N = 36$ to 48 with step of 4 for the 20 MHz channel bandwidth. $N = 38$ to 46 with step of 4 for the 40 MHz channel bandwidth. $N = 42$ for the 80 MHz channel bandwidth.
	5250-5350 MHz (U-NII)	$N = 52$ to 64 with step of 4 for the 20 MHz channel bandwidth. $N = 54$ to 62 with step of 4 for the 40 MHz channel bandwidth. $N = 58$ for the 80 MHz channel bandwidth.
	5470-5725 MHz (U-NII)	$N = 100$ to 140 with step of 4 for the 20 MHz channel bandwidth. $N = 102$ to 134 with step of 4 for the 40 MHz channel bandwidth. $N = 106$ for the 80 MHz channel bandwidth.
	5725-5850 MHz U-NII	$N = 149$ to 165 with step of 4 for the 20 MHz channel bandwidth. $N = 151$ to 159 with step of 4 for the 40 MHz channel bandwidth. $N = 155$ for the 80 MHz channel bandwidth.
Modulation Type	BPSK/QPSK/16QAM/64QAM (OFDM).	
Emission Designator	U-NII(5150-5250, 5250-5350, 5470-5725)	21M8G7D (for 802.11a mod), 22M0G7D (for 802.11n 20 MHz mode), 40M7G7D (for 802.11n 40 MHz mode), 22M1G7D (for 802.11ac 20 MHz mode) 40M8G7D (for 802.11ac 40 MHz mode) 87M0G7D (for 802.11ac 80 MHz mode)
	U-NII(5725-5850)	17M2G7D (for 802.11a mod), 18M2G7D (for 802.11n 20 MHz mode), 36M4G7D (for 802.11n 40 MHz mode), 18M2G7D (for 802.11ac 20 MHz mode) 36M4G7D (for 802.11ac 40 MHz mode) 75M7G7D (for 802.11ac 80 MHz mode)
TPC	☐ Supported, ☒ Not Supported	
Antenna	Type	☐ External, ☒ Integrated
	Ports	☒ Ant 1, ☐ Ant 2, ☐ Ant 3, ☐ Ant 4
	Smart System	☒ SISO (for 802.11a/n/ac), ☐ CDD (for 802.11a), ☐ MIMO (for 802.11n/ac), ☐ Diversity (for 802.11a) : Tx & Rx
	Gain	Ant:0 .7dBi (per antenna port, max.)

Characteristics	Description		
	Remark	When the EUT is put into service, the practical maximum antenna gain should NOT exceed the value as described above.	
Power Supply	Type	☒ AC/DC Adapter	☐ PoE: ☐ Other:

4 General Test Conditions / Configurations

4.1 Test Modes

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

Test Mode	Test Modes Description
11A	IEEE 802.11a with data rate of 6 Mbps using SISO mode.
11N20	IEEE 802.11n with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.
11N40	IEEE 802.11n with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.
11AC20	IEEE 802.11ac with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.
11AC40	IEEE 802.11ac with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.
11AC80	IEEE 802.11ac with data rate of MCS0 and bandwidth of 80 MHz using SISO mode.

4.2 EUT Configurations

4.2.1 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.

4.2.2 Customized Configurations

4.2.2.1 U-NII

Test Mode	Test Channel	Frequency [MHz]	Antenna Port	Duty cycle [%]
11A	36	5180	Ant 1	93
11A	48	5240	Ant 1	93
11A	52	5260	Ant 1	93
11A	64	5320	Ant 1	93
11A	100	5500	Ant 1	93
11A	140	5700	Ant 1	93
11A	149	5745	Ant 1	93
11A	165	5825	Ant 1	93
11N20	36	5180	Ant 1	93
11N20	48	5240	Ant 1	93
11N20	52	5260	Ant 1	93
11N20	64	5320	Ant 1	93
11N20	100	5500	Ant 1	93
11N20	140	5700	Ant 1	93
11N20	149	5745	Ant 1	93
11N20	165	5825	Ant 1	93
11N40	38	5190	Ant 1	83.5
11N40	46	5230	Ant 1	83.5
11N40	54	5270	Ant 1	83.5
11N40	62	5310	Ant 1	83.5
11N40	102	5510	Ant 1	83.5
11N40	134	5670	Ant 1	83.5
11N40	151	5755	Ant 1	83.5
11N40	159	5795	Ant 1	83.5
11AC20	36	5180	Ant 1	92.4
11AC20	48	5240	Ant 1	92.4
11AC20	52	5260	Ant 1	92.4
11AC20	64	5320	Ant 1	92.4
11AC20	100	5500	Ant 1	92.4
11AC20	140	5700	Ant 1	92.4
11AC20	149	5745	Ant 1	92.4
11AC20	165	5825	Ant 1	92.4
11AC40	38	5190	Ant 1	91.2
11AC40	46	5230	Ant 1	91.2

11AC40	54	5270	Ant 1	91.2
11AC40	62	5310	Ant 1	91.2
11AC40	102	5510	Ant 1	91.2
11AC40	134	5670	Ant 1	91.2
11AC40	151	5755	Ant 1	91.2
11AC40	159	5795	Ant 1	91.2
11AC80	42	5210	Ant 1	85.2
11AC80	58	5290	Ant 1	85.2
11AC80	106	5530	Ant 1	85.2
11AC80	155	5775	Ant 1	85.2

4.3 Test Environments

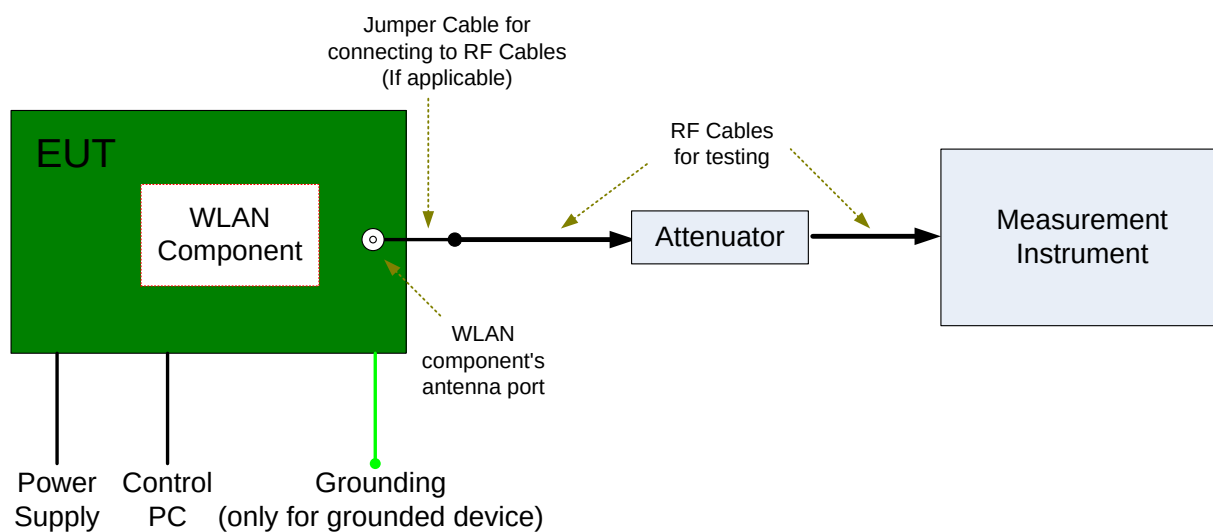
NOTE: The values used in the test report may be stringent than the declared.

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
NTNV	Ambient	3.8 VDC	Ambient

4.4 Test Setups

4.4.1 Test Setup 1

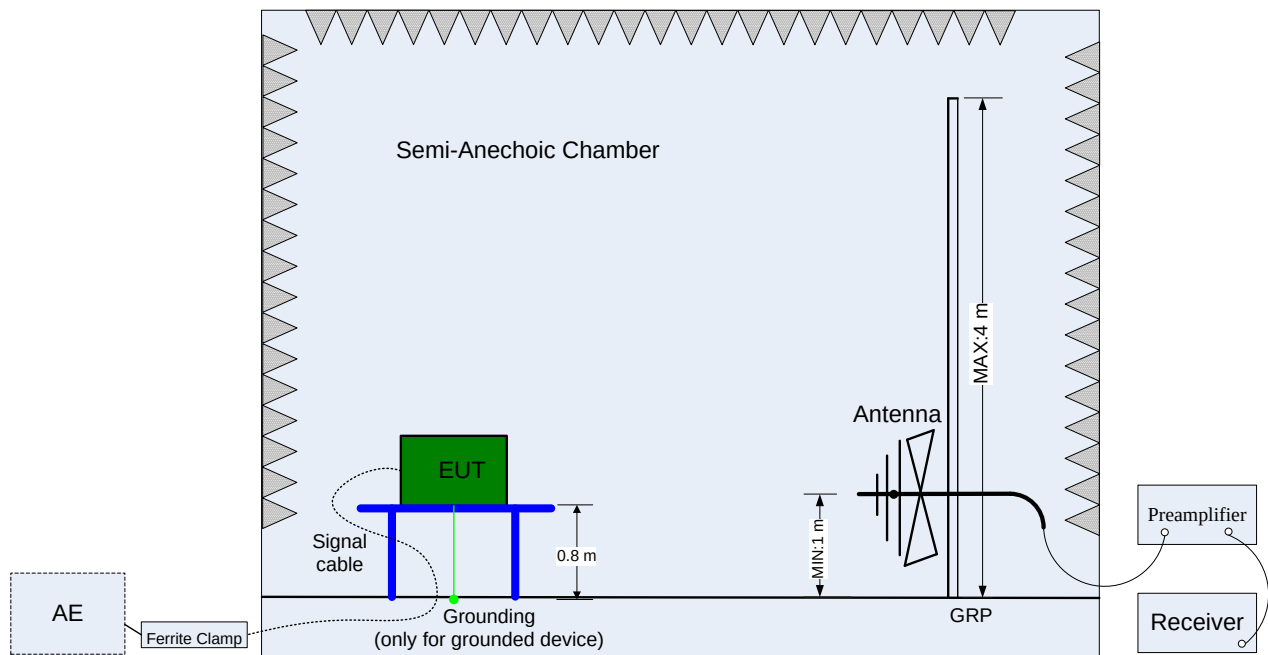
The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



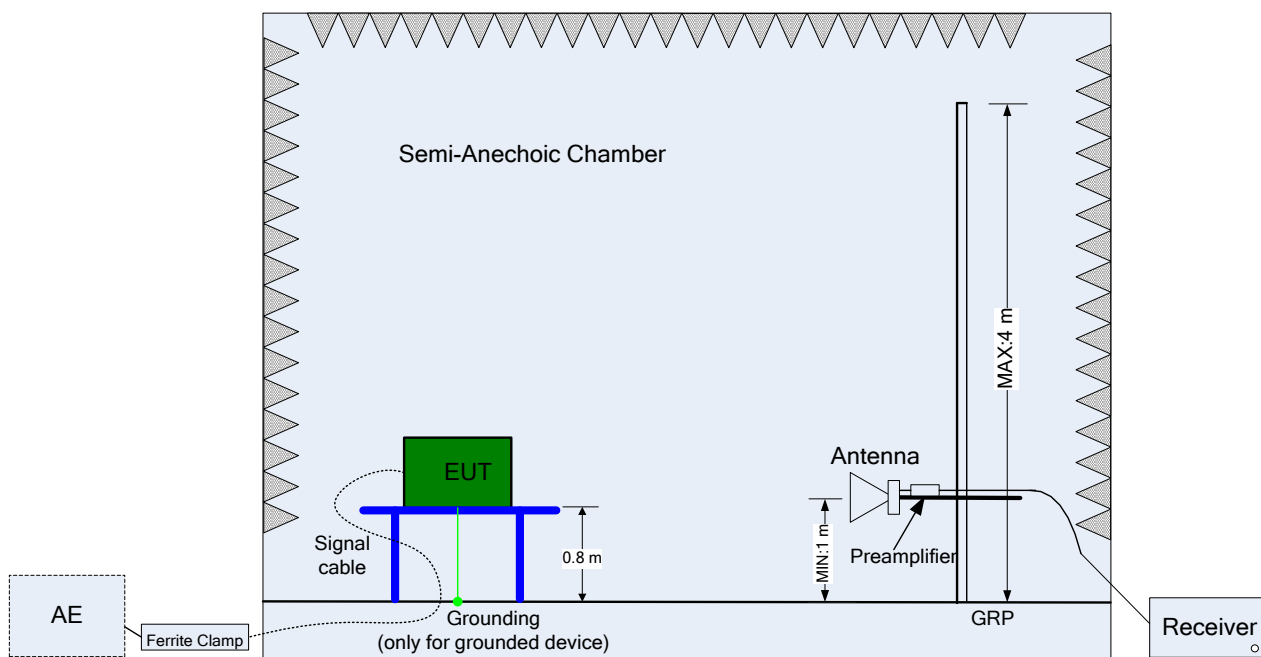
4.4.2 Test Setup 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.4. The test distance is 3 m (for 30 MHz to 26.5 GHz) or 1 m (for 26.5 GHz to 40 GHz). The setup is according to ANSI C63.10, 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)

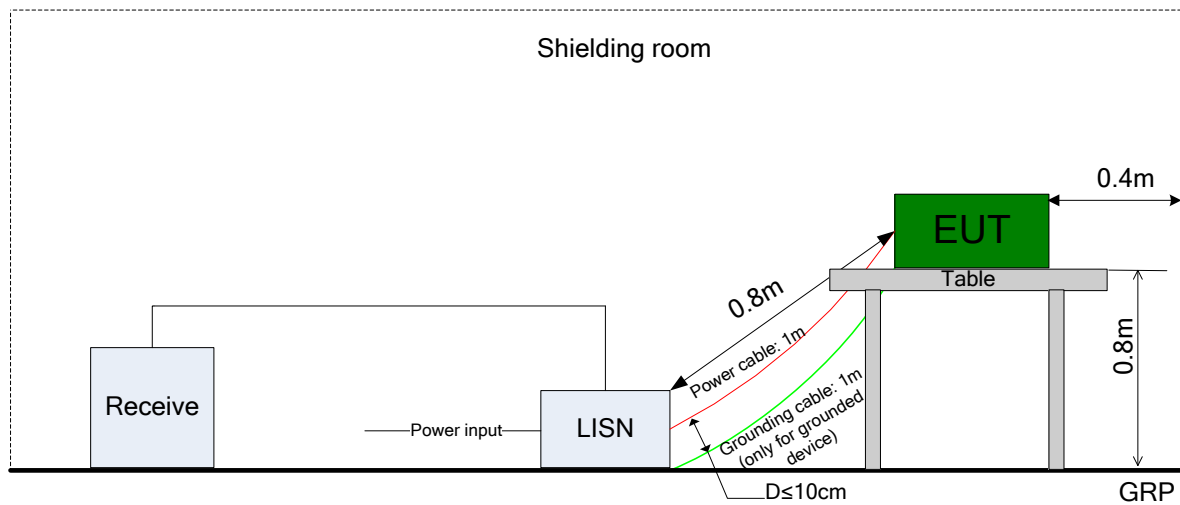


(Above 1 GHz)

4.4.3 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.



4.5 Test Conditions

4.5.1 U-NII

Test Case	Test Conditions		
	Configuration	Description	
26 dB Emission Bandwidth (EBW)	Meas. Method	FCC KDB 789033 §C).	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	All EUT conf. with Tx modes.	
Maximum Conducted Output Power	Meas. Method	FCC KDB 789033 §E)2)b) Method SA-1 and d) Method SA-2.	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	All EUT conf. with Tx modes.	
Peak Power Spectral Density	Meas. Method	FCC KDB 789033 §F).	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	All EUT conf. with Tx modes.	
Peak Excursion Ratio	Meas. Method	FCC KDB 789033 §F).	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	All EUT conf. with Tx modes.	
Unwanted Emissions (Cond.)	Meas. Method	FCC KDB 789033 §G), Conducted (antenna-port). NOTE: Antenna-port conducted measurements (Cond.) are acceptable as an alternative to radiated measurements (Rad.) 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 (Rad-a) for cabinet/case emissions will also be required.	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	5150-5250	All EUT Test Mode 20 MHz bandwidth: Ch.36, Ch.48 40 MHz bandwidth: Ch.38, Ch.46 80 MHz bandwidth: Ch.42
		5250-5350	All EUT Test Mode 20 MHz bandwidth: Ch.52, Ch.64 40 MHz bandwidth: Ch.54, Ch.62 80 MHz bandwidth: Ch.58
		5470-5725	All EUT Test Mode 20 MHz bandwidth: Ch.100, Ch.140 40 MHz bandwidth: Ch.102, Ch.134

Test Case	Test Conditions		
	Configuration	Description	
			80 MHz bandwidth: Ch.106
		5725-5850	All EUT Test Mode 20 MHz bandwidth: Ch.149, Ch.157, Ch.165 40 MHz bandwidth: Ch.151, Ch.159 80 MHz bandwidth: Ch.155
Frequency Stability	Meas. Method	15.407(g) Frequency Stability	
	Test Env.	(1)VL, VN and VH of Rated Voltage at Ambient Climate. (2) -5 °C,5°C,15°C,-25°C,35°C,45°C,50°C	
	Test Setup	Test Setup 1	
	EUT Conf.	Ch.36,Ch.165	

5 Main Test Instruments

NOTE: Unless otherwise specified, the calibration intervals for test instruments were Annual (per year). The other intervals, if applicable, are marked with (##y), which denotes ## years calibration interval.

Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal- Due
Power supply	KEITHLEY	2303	1342889	2015-09-16	2017-09-15
Wireless Communication Test set	Agilent	N4010A	MY49081592	2015-10-30	2016-10-29
Universal Radio Communication Tester	R&S	CMU200	123299	2015-10-30	2016-10-29
Spectrum Analyzer	Agilent	N9020A	MY52090652	2015-07-08	2016-07-07
Universal Radio Communication Tester	R & S	CMW500	126854	2016-01-08	2017-01-07
Spectrum Analyzer	Agilent	E4440A	MY48250119	2015-07-08	2016-07-07
Signal Analyzer	R&S	FSQ31	200021	2015-10-30	2016-10-29
Spectrum Analyzer	Agilent	N9030A	MY49431698	2015-10-30	2016-10-29
Temperature Chamber	WEISS	WKL64	56246002940010	2016-01-21	2017-01-20
Signal generator	Agilent	E8257D	MY49281095	2015-10-30	2016-10-29
Vector Signal Generator	R&S	SMU200A	104162	2015-10-30	2016-10-29
Test receiver	R&S	ESU26	100387	2015-6-24	2016-06-23
Test receiver	R&S	ESCI	101163	2015-6-24	2016-06-23
Spectrum analyzer	R&S	FSU3	200474	2015-06-15	2016-06-14
Spectrum analyzer	R&S	FSU43	100144	2015-06-15	2016-06-14
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100262	2015-4-30	2017-4-29
LOOP Antennas(9kHz-30MHz)	R&S	HFH2-Z2	100263	2015-4-30	2017-4-29
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	9163-490	2015-4-30	2017-4-29
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	9163-520	2015-4-30	2017-4-29
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100304	2015-4-30	2017-4-29
double ridged horn antenna (0.8G-18GHz)	R&S	HF907	100305	2015-4-30	2017-4-29
Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	3160-09	5140299	2015-7-15	2017-7-14
Artificial Main Network	R&S	ENV4200	100134	2015-6-24	2016-6-23
Line Impedance Stabilization Network	R&S	ENV216	100382	2015-6-24	2016-6-23
Signal Generator	Agilent	E4438C	MY49071538	2015-03-10	2016-03-09



Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal- Due
Power Detecting & Sampling Unit	R&S	OSP-B157	100914	2015-07-27	2016-07-26

END