



# RF Test Report

**Product Name: Microphone Array**

**Product Model: HUAWEI VPM220W**

**Report Number: SYBH(R)01037530EB-1**

**FCC ID: QIS-VPM220W**

**IC: 6369A-VPM220W**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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## 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, 6369A-2 and 6369A-3.
5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers of test site No.1 are R-3892, G-415, C-4361, and T-1348, and the accreditation numbers of test site No.2 are R-3760, G-485, C-4210 and T-1237.
6. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
7. The test report is invalid if there is any evidence of erasure and/or falsification.
8. The test report is only valid for the test samples.
9. 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.



**Applicant:** Huawei Technologies Co., Ltd.  
**Address:** Administration Building, Headquarters of Huawei Technologies Co., Ltd.,  
Bantian, Longgang District, Shenzhen, 518129, P.R.C  
**Product Name:** Microphone Array  
**Product Model:** HUAWEI VPM220W

**Date of Receipt Sample:** 2013-07-18  
**Start Date of Test:** 2013-07-18  
**End Date of Test:** 2013-08-31

**Test Result:** Pass

<b>Approved by Senior Engineer:</b>	2013-09-03	Zhang Xinghai	<i>Zhang Xing hai</i>
	Date	Name	Signature

<b>Prepared by:</b>	2013-09-03	Zhang Weimin	<i>Zhang Weimin</i>
	Date	Name	Signature



### Modification Record

No.	Last Report No.	Modification Description
1	---	First report.



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## 1 General Information

### 1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2, Subpart J (10-1-12 Edition)  
47 CFR FCC Part 15, Subpart C (10-1-12 Edition)  
IC RSS-Gen (Issue 3, December 2010)  
IC RSS-210 (Issue 8, December 2010)

Test Method: FCC KDB 558074 D01 DTS Meas Guidance v03r01  
ANSI C63.10-2009, American National Standard for Testing Unlicensed Wireless  
Devices

### 1.2 Test Location

Test Location 1 (TL1): 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

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



## 2 Test Summary

### 2.1 Measurement Technical Requirements

Test Item	FCC Rule	IC Rule	Requirements	Test Result	Verdict (NOTE 1)	Test Location
DTS (6 dB) Bandwidth	15.247(a)(2)	RSS-210,A8.2(a)	≥ 500 kHz.	Annex A	Pass	TL1
Occupied Bandwidth	---	RSS-210,2.1 RSS-Gen,4.6.1	No limit.	Annex B	Pass	TL1
Maximum Peak Conducted Output Power	15.247(b)(3)	RSS-210,A8.4(4)	<30dBm-IF{G[dBi]>6dBi, G[dBi]-6dB,0dB}. (Peak)	Annex C	Pass	TL1
Maximum Power Spectral Density Level	15.247(e)	RSS-210,A8.2(b)	<8dBm/3kHz-IF{G[dBi]>6dBi,G[dBi]-6dB,0dB}. (Peak)	Annex D	Pass	TL1
Unwanted Emissions into Non-Restricted Frequency Bands	15.247(d)	RSS-210,A8.5	<-20dBc/100kHz.	Annex E	Pass	TL1
Unwanted Emissions into Restricted Frequency Bands (NOTE 2)	15.247(d) 15.209	RSS-210,A8.5 RSS-210,2.2 RSS-Gen,7.2.2 RSS-Gen,7.2.5	§15.209/§7.2.5 limit.	Annex F (Cond.), Annex G (Radt.)	Pass	TL1 (Cond.), TL1 (Radt.)
AC Power Line Conducted Emissions	15.207	RSS-Gen,7.2.4	§15.207/§7.2.4 limit.	Annex H	Pass	TL1
Photos of Test Setups	---	---	---	Annex I	---	---
<p>NOTE 1: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".</p> <p>NOTE 2: According to KDB558074, antenna-port conducted measurements (Cond.) are acceptable as an alternative to radiated measurements (Radt.) 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>						

## 2.2 Non-measurement Technical Requirements

Item	FCC Rule	IC Rule	Requirements	Evidence	Verdict (NOTE)
Antenna use	§15.203	RSS-Gen,7.1.2	Permanently attached antenna. User manual notices required (see detailed for RSS-Gen, 7.1.2) .	See user's manual.	Comply
User manual notice for licence-exempt radio apparatus	---	RSS-Gen,7.1.3	User manual notice for licence-exempt radio apparatus is required (see detailed for RSS-Gen, 7.1.3).	See user's manual.	Comply
Radio apparatus containing digital circuits	15 subpart B	RSS-Gen,7.1.4 ICES-003	FCC: §15 subpart B. IC: ICES-003.	See separate test EMC report.	Comply
Radiation exposure	§15.247(i) §1.1307(b) §2.1091 §2.1093	RSS-Gen,5.6 RSS-102	General population/uncontrolled limit.	See separate test MPE/EMF report or declaration.	Comply
NOTE: For the verdict, the "N/A" denotes "not applicable", the "N/T" denotes "not tested".					



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

#### 3.1 General Description

The HUAWEI VPM220W wireless microphone array (VPM220W) is a wireless audio pickup device that can seamlessly integrate with HUAWEI TEX0 series videoconferencing endpoints.

The VPM220W uses three microphones spaced 120 degrees apart, offering 360-degree audio pickup at a radius of up to 6 meters. The VPM220W offers premium audio input to videoconferencing endpoints, significantly contributing to a more pleasant conference experience.

#### 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	
Board Name	Description
VC84WMIC	VPM220W,VC84WMIC,Wireless Microphone Array Main board,VPM220W,RoHS,2*2 Assembled Board
VC84CHAR	VPM220W,VC84CHAR,Wireless Microphone Array Charger board,VPM220W,RoHS,3*1 Assembled Board
VC84WKEY	VPM220W,VC84WKEY,Wireless Microphone Array Key board,VPM220W,RoHS,3*5 Assembled Board
VC84LINK	VPM220W,VC84Link,Wireless Microphone Array Link board,VPM220W,RoHS,2*4 Assembled Board

##### 3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Power Adapter	HW050200U 3W	1. Shenzhen OCT xinqiao Technology Co.,Ltd 2. SHENZHEN HUNTKEY ELECTRIC CO., LTD	Adapter--10degC-45degC-100V-240V-5.0V/2.0 A-UL 2PIN/ DC USB 2.0-ERP V-UL/DOE
Battery	HB5F2H2P	Scudcn (fujian) Electronics Co., Ltd.	Rechargeable Battery,HB5F2H2P,3.7V,3.52Ah,Battery Group,65mm*45.2mm*11.3mm
USB Cable	LSA00389	Unirise Communication	Terminal Accessory,Data Cable,Usb A Male to



Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
		Technology Co.,Ltd	Micro Usb 120cm,Black,Terminal Dedicated
	H09-000367	SHEN ZHEN PANG NGAI INDUSTRIAL CO., LTD	

### 3.3 Technical Description

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	2400-2483.5 MHz band	$f_c = 2407 \text{ MHz} + N * 5 \text{ MHz}$ , where: <ul style="list-style-type: none"> <li>● <math>f_c</math> = "Operating Frequency" in MHz,</li> <li>● <math>N</math> = "Channel Number" with the range from 1 to 11 with step of 1 for the 20 MHz channel bandwidth, or 3 to 9 with step of 1 for the 40 MHz channel bandwidth.</li> </ul>	
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	
	802.11n (SISO)	MCS 0 to MCS 7	
	802.11n (MIMO)	(Not supported)	
Modulation Type	DBPSK/DQPSK/CCK (DSSS), BPSK/QPSK/16QAM/64QAM (OFDM).		
Emission Designator	14M1G1D (for 802.11b mode), 16M4G7D (for 802.11g mod), 35M4G7D (for 802.11n mode)		
Antenna	Model/ID	There are two antenna types due to different suppliers: Ant 1 (SL10156A) and Ant 2 (3663-12-000-R).	
	Type	<input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated	
	Ports	<input checked="" type="checkbox"/> Ant 1, <input type="checkbox"/> Ant 2, <input type="checkbox"/> Ant 3, <input type="checkbox"/> Ant 4	
	Smart System	<input checked="" type="checkbox"/> SISO (for 802.11b/g/n), <input type="checkbox"/> MIMO (for 802.11n): 2 Tx & 2 Rx, <input type="checkbox"/> Diversity (for 802.11b/g) :       Tx &       Rx	
	Gain	Ant 1: 0.828 dBi (per antenna port, max.), Ant 2: 1.71 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	<input checked="" type="checkbox"/> AC/DC Adapter	<input type="checkbox"/> PoE: <input checked="" type="checkbox"/> Other: Battery
	Model/ID	HW050200U3W	HB5F2H2P
	Specification	IN: 100V-240V OUT: 5.0V	Rechargeable Battery, HB5F2H2P, 3.7V, 3.52Ah, Battery Group, 65mm*45.2mm*11.3mm



## 4 General Test Conditions / Configurations

### 4.1 EUT Configurations

#### 4.1.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, <ul style="list-style-type: none"><li>All TX tests are performed at all TX antenna ports of the EUT, and</li><li>All RX tests are performed at all RX antenna ports of the EUT.</li></ul>
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

#### 4.1.2 Customized Configurations

# EUT Conf.	Test Mode	Ant. Port	TX/RX Freq. [MHz]	Power Conf. per Port	Duty Cycle
11B1-B-Ant1	Tx, 802.11b, 1 Mbps, SISO.	Ant 1	2412 (Ch.1)	8	0.97
11B1-M-Ant1	Tx, 802.11b, 1 Mbps, SISO.	Ant 1	2437 (Ch.6)	8	0.97
11B1-T-Ant1	Tx, 802.11b, 1 Mbps, SISO.	Ant 1	2462 (Ch.11)	8	0.97
11G6-B-Ant1	Tx, 802.11g, 6 Mbps, SISO.	Ant 1	2412 (Ch.1)	8	0.87
11G6-M-Ant1	Tx, 802.11g, 6 Mbps, SISO.	Ant 1	2437 (Ch.6)	8	0.87
11G6-T-Ant1	Tx, 802.11g, 6 Mbps, SISO.	Ant 1	2462 (Ch.11)	8	0.87
11N0-20B-Ant1	Tx, 802.11n, 20 MHz, MCS0, SISO.	Ant 1	2412 (Ch.1)	8	0.86
11N0-20M-Ant1	Tx, 802.11n, 20 MHz, MCS0, SISO.	Ant 1	2437 (Ch.6)	8	0.86
11N0-20T-Ant1	Tx, 802.11n, 20 MHz, MCS0, SISO.	Ant 1	2462 (Ch.11)	8	0.86
11N0-40B-Ant1	Tx, 802.11n, 40 MHz, MCS0, SISO.	Ant 1	2422 (Ch.3)	8	0.75
11N0-40M-Ant1	Tx, 802.11n, 40 MHz, MCS0, SISO.	Ant 1	2437 (Ch.6)	8	0.75
11N0-40T-Ant1	Tx, 802.11n, 40 MHz, MCS0, SISO.	Ant 1	2452 (Ch.9)	8	0.75



## 4.2 Test Environments

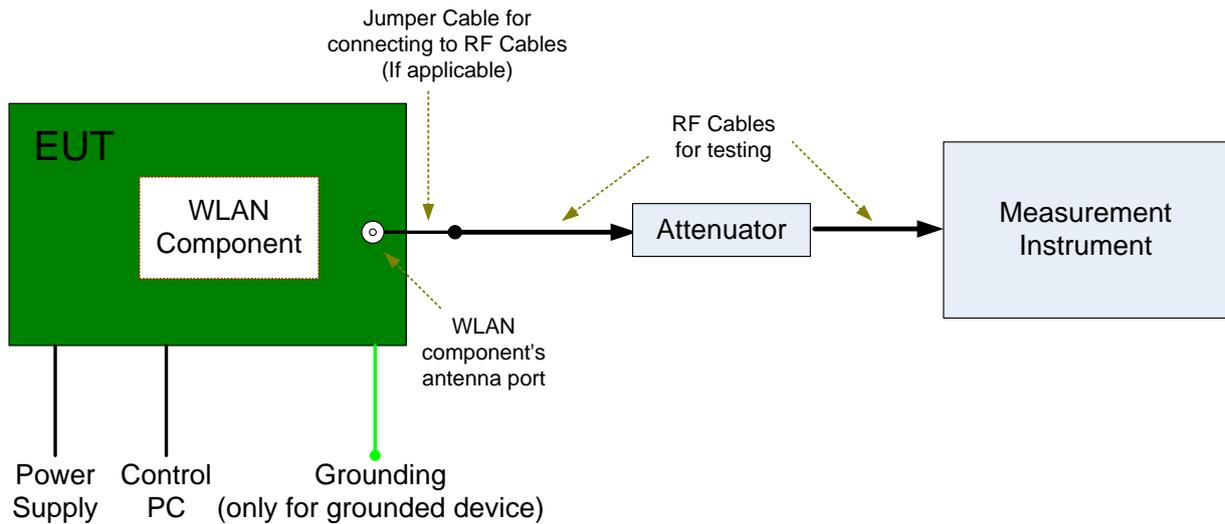
NOTE: The values used in the test report may be stringent than the declared.

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
NTNV	Ambient	3.7 VDC (Battery) & 120 VAC, 60 Hz (AC/DC Adapter)	Ambient

### 4.3 Test Setups

#### 4.3.1 Test Setup 1

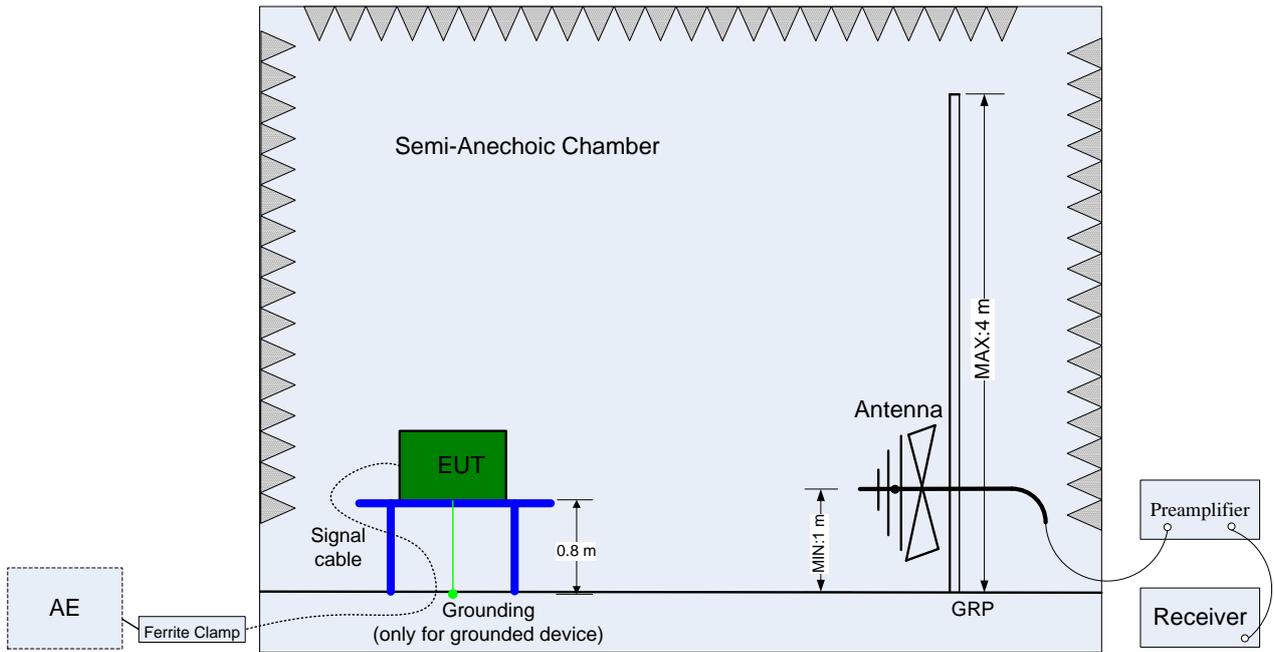
The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



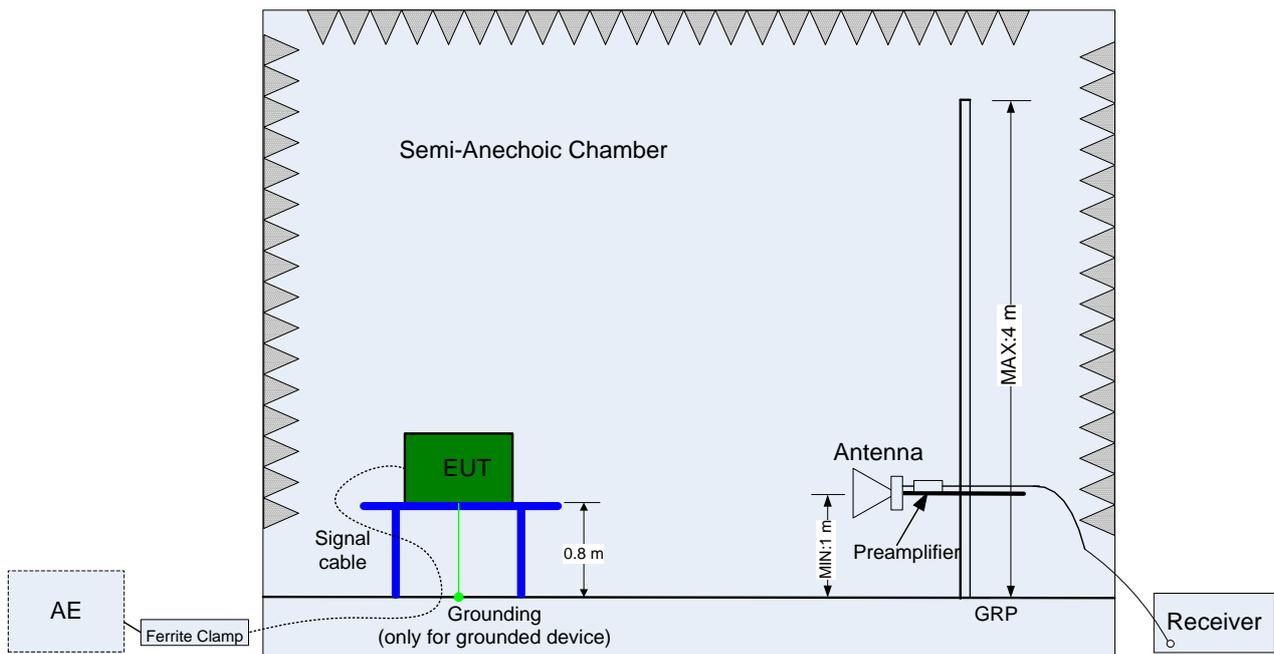
#### 4.3.2 Test Setup 2

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. 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)

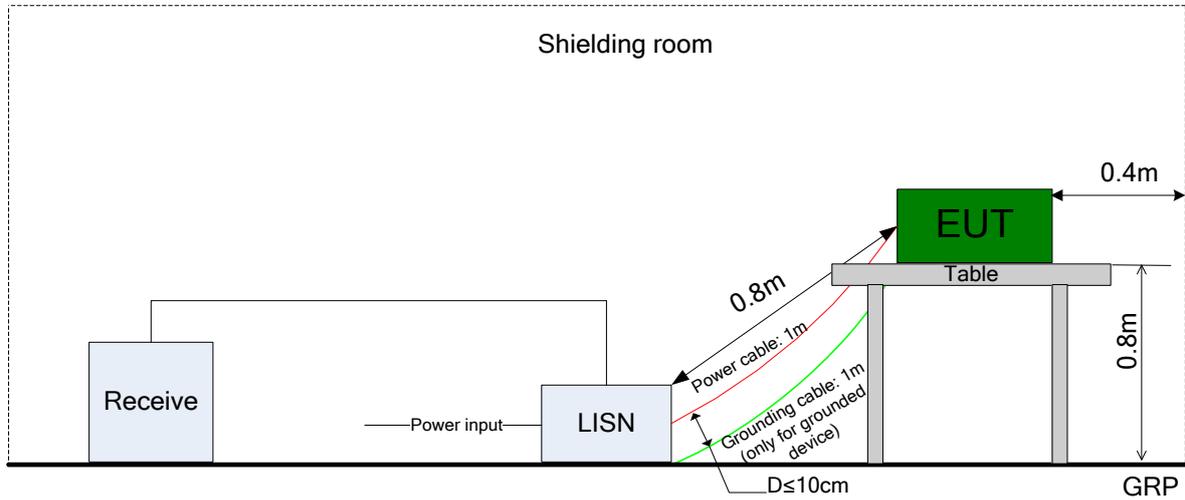


(Above 1 GHz)

### 4.3.3 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.





#### 4.4 Test Conditions

Configuration	Description	
DTS (6 dB) Bandwidth		
Test Method	FCC KDB 558074 §8.1 Option 1.	
Test Env.	NTNV	
Test Setup	Test Setup 1	
EUT Conf.	All EUT conf. with Tx modes.	
Occupied Bandwidth		
Test Method	RSS-Gen, §4.6.1.	
Test Env.	NTNV	
Test Setup	Test Setup 1	
EUT Conf.	All EUT conf. with Tx modes.	
Maximum Peak Conducted Output Power		
Test Method	FCC KDB 558074 §9.1.2 Integrated Band Power Method.	
Test Env.	NTNV	
Test Setup	Test Setup 1	
EUT Conf.	All EUT conf. with Tx modes.	
Maximum Power Spectral Density Level		
Test Method	FCC KDB 558074 §10.2 Method PKPSD (peak PSD).	
Test Env.	NTNV	
Test Setup	Test Setup 1	
EUT Conf.	All EUT conf. with Tx modes.	
Unwanted Emissions into Non-Restricted Frequency Bands		
Test Method	FCC KDB 558074 §11.	
Test Env.	NTNV	
Test Setup	Test Setup 1	
EUT Conf.	All EUT conf. with Tx modes.	
Unwanted Emissions into Restricted Frequency Bands		
Test Method	Cond.	FCC KDB 558074 §12.2, Conducted (antenna-port).
	Radt.	ANSI C63.10; FCC KDB 558074 §12, Radiated (Radt_A: whole device emissions; Radt_B: cabinet/case emissions with impedance matching for antenna-port). (1) 9 kHz to 150 kHz: Pre: RBW=300Hz; VBW=~1kHz; Det=Peak. Final: --- (2) 150 kHz to 30 MHz: Pre: RBW=10kHz; VBW=30kHz; Det=Peak. Final: --- (3) 30 MHz to 1 GHz: Pre: RBW=100kHz; VBW=300kHz; Det=Peak. Final: RBW=120kHz; Det=CISPR Quasi-Peak. (4) 1 GHz to 40 GHz:



Configuration	Description		
		Average: RBW=1MHz; VBW=3MHz; Det.=RMS; SPAN/Sweep-point≤RBW/2; Sweep-time=Auto; Trace≥RMS*100; Add-Transd.=10*Ig(1/X). Peak: RBW=1MHz; VBW=3MHz; Det.=Peak; Sweep-time=Auto; Trace=Max Hold.	
Test Env.	Cond.	NTNV	
	Radt.	NTNV	
Test Setup	Cond.	Test Setup 1	
	Radt.	Test Setup 2	
EUT Conf.	Cond.	All ranges	All EUT conf. with Tx modes.
	Radt_A	9k-30MHz	Worst Case (11B/1_B@1, Ant 2)
		30M-1GHz	Worst Case (11B/1_B@1, Ant 2)
		1G-3GHz	11B/1_B@1 (Ant 1) 11B/1_M@1 (Ant 1) 11B/1_T@1 (Ant 1) 11G/6_B@1 (Ant 1) 11G/6_M@1 (Ant 1) 11G/6_T@1 (Ant 1) 11N20/0_B@1 (Ant 1) 11N20/0_M@1 (Ant 1) 11N20/0_T@1 (Ant 1) 11N40/0_B@1 (Ant 1) 11N40/0_M@1 (Ant 1) 11N40/0_T@1 (Ant 1) Worse Case (11N40/0_B@1, Ant 2) Worse Case (11N40/0_T@1, Ant 2)
		3G-18GHz	Worst Case (11B/1_B@1, Ant 2)
		18G-26.5GHz	Worst Case (11B/1_B@1, Ant 2)
		AC Power Line Conducted Emissions	
Test Method	AC mains conducted. Pre: RBW = 10 kHz; Det. = Peak. Final: RBW = 9 kHz; Det. = CISPR Quasi-Peak & Average.		
Test Env.	NTNV		
Test Setup	Test Setup 3		
EUT Conf.	11B/1_B@1, Ant 2		



## 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. Due
Test Setup 1				
Spectrum Analyzer	Agilent	N9020A	MY51240619	2014-02-03
Test Setup 2				
EMI Test Receiver	R&S	ESU26	100150	2014-05-14
Bilog Antenna (30M-1GHz)	SCHWARZBECK	VULB 9163	9163-357	2014-05-27 (2y)
Horn Antenna (1G-18GHz)	R&S	HF906	100683	2014-02-01 (2y)
Horn Antenna (18G-26.5GHz)	ETS	3160-9	053215-21874	2014-12-24 (2y)
Loop Antennas (9kHz-30MHz)	R&S	HFH2-Z2	100262	2015-03-22 (2y)
Test Setup 3				
EMI Test Receiver	R&S	ESCI	101163	2014-01-28
Artificial Mains Network	R&S	ENV4200	100134	2014-01-28

END