



EMC Test Report

Product Name: Smart Phone

Model Number: LDN-L01

Report No: SYBH(Z-EMC)20180302011002-2

FCC ID: QISLDN-L01

Reliability Laboratory of Huawei Technologies Co., Ltd.

(Global Compliance and Testing Center of Huawei Technologies Co., Ltd)

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Notice

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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 Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-1.
4. 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.
5. The laboratory has been recognized by the US Federal Communications Commission (FCC) to perform compliance testing subject to the Commission's Declaration Of Conformity (DOC) and Certification rules. The Designation Number is CN1173, and the Test Firm Registration Number is 294140.”
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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 Test Item: 2018-03-14
Start Date of Test: 2018-03-15
End Date of Test: 2018-03-19
Test Result: Pass

**Approved By
(Lab Manager)**

2018-03-20
Date

Roger Zhang
Name

Roger Zhang

Signature

**Prepared by
(Test Engineer)**

2018-03-19
Date

Chang Lina
Name

Chang Lina

Signature



Modification Record

No.	Last Report No.	Modification Description
1	SYBH(Z-EMC)098122017	First Report.
2	SYBH(Z-EMC)20180302011002	Add LTE B7 LNA(Low Noise Amplifier)

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1 General Information

1.1 EUT Description

EUT Description	
Product Name	Smart Phone
Model Number	LDN-L01
Input voltage	3.82V
TX Frequency	GSM 850:824MHz to 849MHz PCS 1900:1850MHz to 1910MHz WCDMA Band II: 1850MHz to 1910MHz WCDMA Band V: 824MHz to 849MHz LTE BAND 5: 824MHz to 849MHz LTE BAND 7:2500MHz to 2570MHz WIFI: 2412MHz to 2462MHz Bluetooth: 2402MHz to 2480MHz NFC: 13.56MHz
RX Frequency	GSM 850:869MHz to 894MHz PCS 1900:1930MHz to 1990MHz WCDMA Band II: 1930MHz to 1990MHz WCDMA Band V: 869MHz to 894MHz LTE BAND 5: 869MHz to 894MHz LTE BAND 7:2620MHz to 2690MHz WIFI: 2412MHz to 2462MHz Bluetooth: 2402MHz to 2480MHz FM: 87.5 MHz to 108MHz NFC: 13.56MHz GPS: 1575.42MHz
S/N	8XEBBGA822300085
HW Version	HL1LDNM
SW Version	LDN-L01 8.0.0.112M(C900)
EUT Accessory	
Data cable(04071002)	Data Cable USB A Male to Male to Micro Usb,Shielded Manufacturer: FOXCONN INTERCONNECT TECHNOLOGY LIMITED. LUXSHARE Precision Industry Co., Ltd HONGLIN TECHNOLOGY CO.,LTD.
Adapter	Manufacturer:Huawei Technologies Co.,Ltd. Model: HW-050100U01 Input voltage: 100-240V 50/60Hz ,0.5A Output Voltage: 5V  1A Rated Power:5W SN: H780K8H8413423 P78001GBP01059 B78004GAC05122
Rechargeable Li-ion	Manufacturer:Huawei Technologies Co.,Ltd. Battery Model: HB366481ECW-11 Rated capacity: 2900mAh Nominal Voltage:  +3.82V Charging Voltage:  +4.35V SN: SF3FACHA08G67851

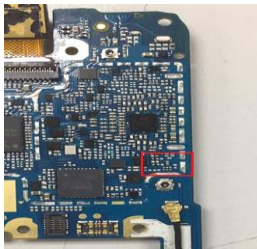
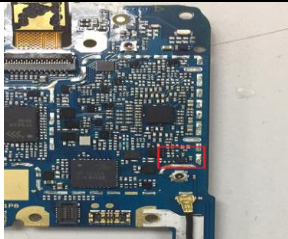
	SBKSA1H908X00844 SHUALYHB16X00325
Earphone(22040300)	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co. ,LTD GoerTek Inc. FOXCONN INTERCONNECT TECHNOLOGY LIMITED Boluo County Quancheng Electronic Co.,ltd
Earphone(22040150)	Manufacturer: Jiangxi Lianchuang Hongsheng Electronic Co. ,LTD GoerTek Inc. Boluo County Quancheng Electronic Co.,ltd

Remark: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed information.

1.2 Differences Description

Compared with the previous report: SYBH(Z-EMC)097122017-1.

The difference between model LDN-L01 change before and change after is show in the below table:

	Model	LDN-L01 Change before	LDN-L01 Change after
Licensed Frequency	LTE BAND	B1/3/5/7/8/20	B1/3/5/7/8/20
	UMTS BAND	B1/2/5/8	B1/2/5/8
	GSM	B2/B3/B5/B8	B2/B3/B5/B8
	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
	IC	the same	the same
	Antenna	the same	the same
Hardware	Ram / Rom	the same	the same
	Camera	the same	the same
	PCB		 Add LTE B7 LNA
	USB Port	the same	the same
	SIM	the same	the same
Software	Software version	LDN-L01 5.0.1.37(C900)	LDN-L01 8.0.0.112M(C900)
Appearance	Dimension	158.3x76.7x7.8mm	158.3x76.7x7.8mm
	Color	the same	the same
Accessory	Battery	the same	the same
	External Charger	the same	the same
	USB label	the same	the same
	Earphone	the same	the same

With the consideration of identities and differences listed above, the LTE band 7 traffic mode of all EMC items were tested. Other data refer to the previous report number SYBH(Z-EMC)097122017-1.

1.3 Test Site Information

Test Site 1:	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Test Site Location:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.4 Applied Standards

APPLIED STANDARD

47 CFR FCC Part 15:2016, Subpart B

2 Summary of Results

Summary of Results				
Test Items	Test Mode	Performance Class & Required Performance Criteria	Result	Site
<u>Radiated Emissions</u> Enclosure Port	Mode 2~ Mode 5	CLASS B	Pass	Site1
<u>Conducted Emissions</u> ☐ DC Power Port ☒ AC Power Port ☐ Telecommunication Ports	Mode 1~ Mode 5	CLASS B	Pass	Site1
Note: 1, Measurement taken is within the uncertainty of test system. 2, ☒ The item has been tested; ☐ The item has not been tested.				

During the measurement, the environmental conditions complied with the range listed as below.

Item	Required
Ambient temperature	15°C ~ 35°C
Relative humidity	25% ~ 75%
Atmospheric pressure	86kPa ~ 106kPa

3 System Configuration during EMC Test

3.1 Test Mode

The EUT was configured, installed, arranged and operated in a manner consistent with typical application. The following mode(s) were applied during the compliance test.

Test Mode	
Mode 1:	Charging +traffic +WIFI+BT+GPS+NFC On +Earphone
Mode 2:	Charging +Camera On +Earphone +idle
Mode 3:	Charging +Video Playing +Earphone +idle
Mode 4:	Charging +FM +Earphone +idle
Mode 5:	USB Copy(EUT with PC) +Earphone

Remark:

- 1) If there is one kind of accessories with different models, each one should be applied throughout the compliance test respectively, however, only the worst case will be recorded in this report.
- 2) If EUT has more than one typical operation, only the worst test mode will be recorded in this report.

Traffic Mode:

When the EUT state is switched on and with Radio Resource Control (RRC) connection established.

Idle Mode:

When the EUT state is switched on but without Radio Resource Control (RRC) connection.

Worst Case:

- 1) Radiated Emission

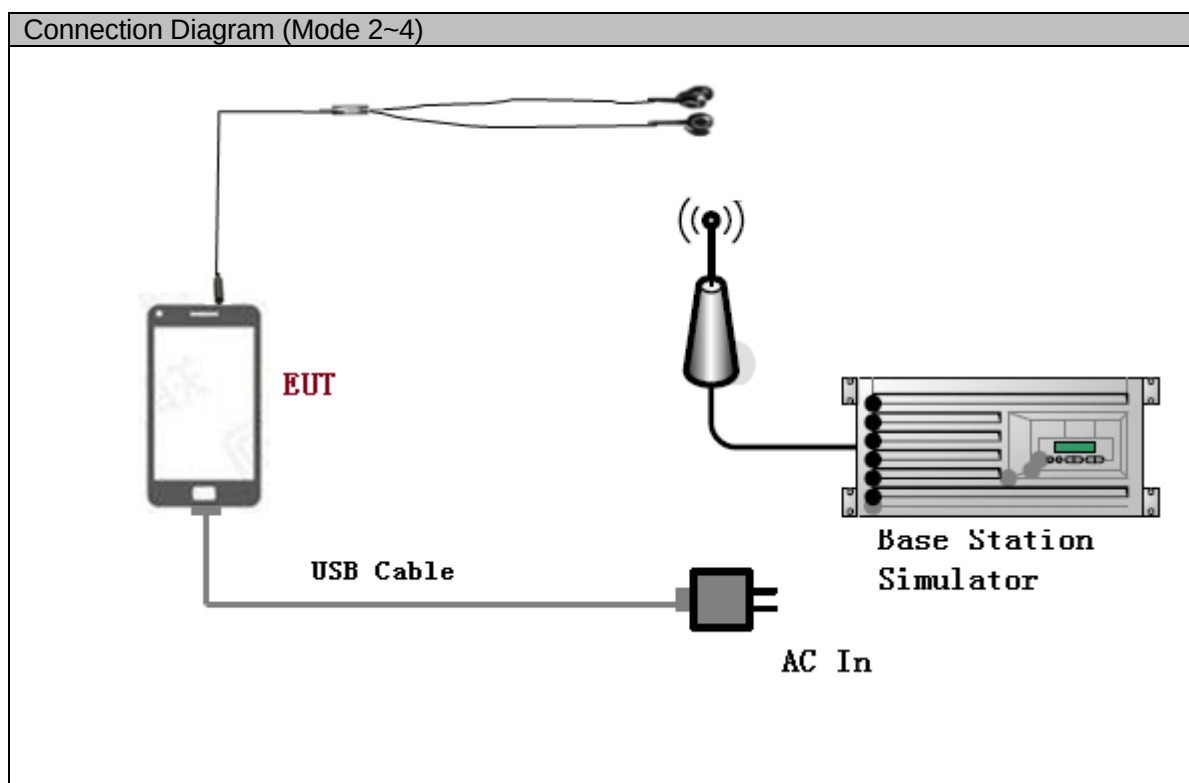
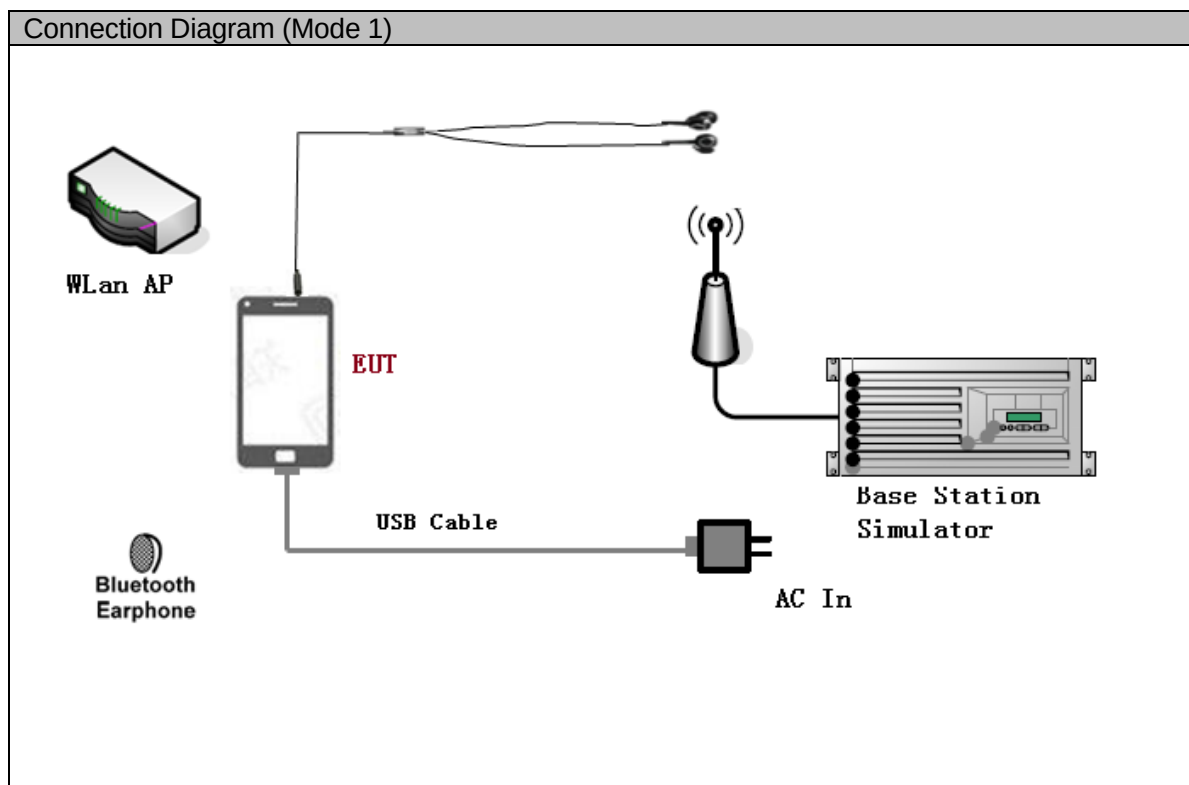
Adapter (Mode 3: HW-050100U01, SN: B79004GAC05122) +Charging + Video Playing +Earphone +idle the result is the worst (30MHz~1GHz).

Adapter (Mode 5: USB Copy(EUT with PC) +Earphone the result is the worst (1GHz~18GHz).

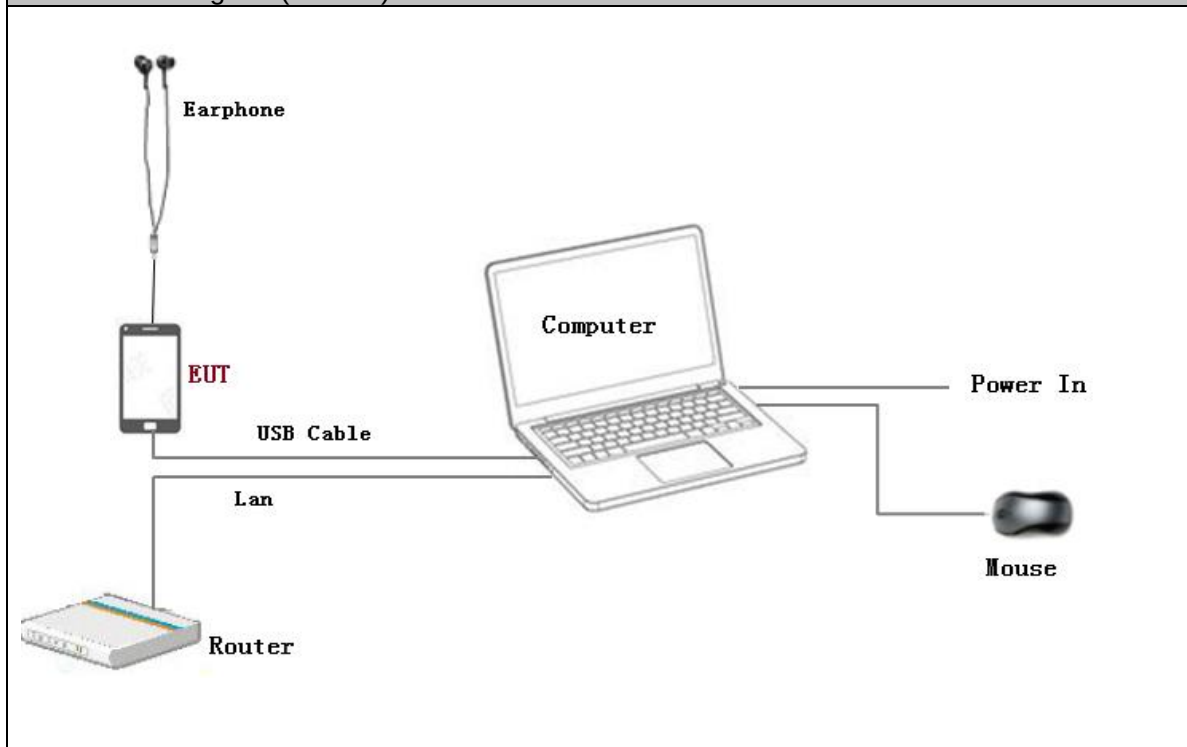
- 2) Conducted Emission

Adapter (Mode 2: HW-050100U01, SN: P78001GBP01059) + Charging +traffic +WIFI+BT+GPS+NFC On +Earphone the result is the worst.

3.2 Test System Configuration



Connection Diagram (Mode 5)



3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
USB	1	<3m	Shielded
Earphone	1	<3m	Unshielded

3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline	Cal interval
Radio Communication Tester	CMU200	R&S	3608082535	2018-03-31	12
Radio Communication Tester	MT8820C	Anritsu	A110518805	2018-05-15	12
Notebook	S3	ThinkPad	A140714638	/	/
mouse	M-U0025-O	Lenovo	HS423HB22TB	/	/

4 Electromagnetic Interference (EMI)

4.1 Radiated Disturbance 30MHz to 18GHz

4.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANCI C63.4: 2014. The test distance was 3m. The set-up and test methods were according to ANCI C63.4: 2014.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 18 GHz by using test script of software; The emissions were measured using Quasi-Peak Detector (30MHz~1GHz) and AV/PK 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. The azimuth range of turntable was 0° to 360°. The receiving antenna has two polarizations V and H.

Measurement bandwidth (RBW) for 30MHz to 1000 MHz: 120 kHz;

Measurement bandwidth (RBW) for 1000MHz to 18000 MHz: 1MHz;

EUT was configured in idle mode and the test performed at worst emission state.

4.1.2 Test setup

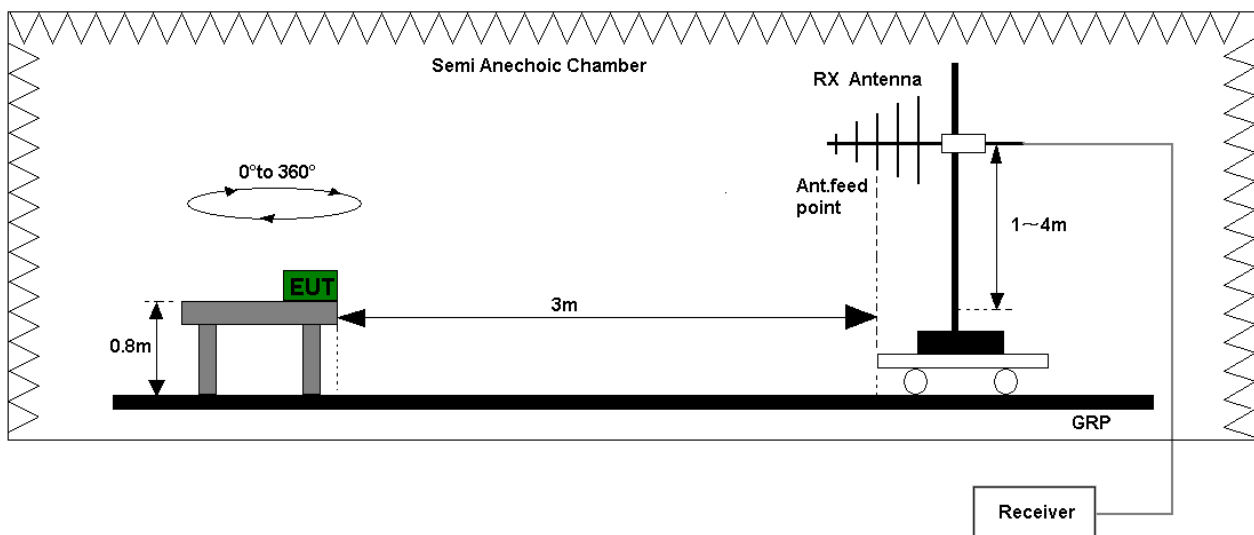


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

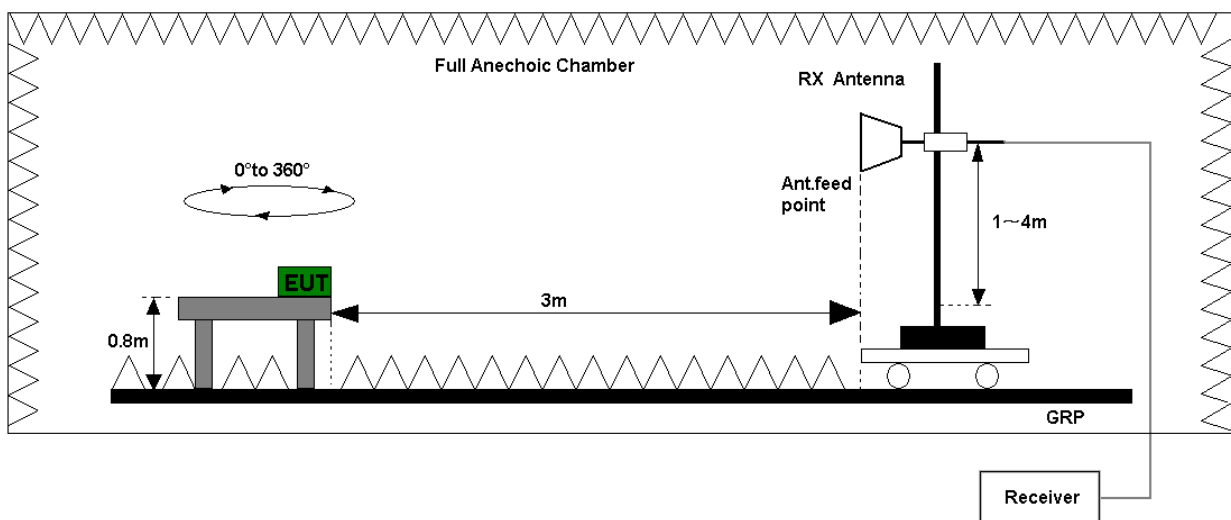


Figure 2. Test set-up of radiated disturbance(above 1GHz)

4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.
Refer to the section 7.1.1 of this report for test data.

Test Limits (Class B)				
Frequency of Emission (MHz)	Radiated Limit			
	Unit(μ V/m)		Unit(dB μ V/m)	
30-88	100		40	
88-216	150		43.5	
216-960	200		46	
Above 960	500		54	
Above 1000	AV	PK	AV	PK
	500	5000	54	74

4.2 Conducted Disturbance 0.15 MHz to 30MHz

4.2.1 Test Procedure

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 away from LISN. The set-up and test methods were according to ANCI C63.4: 2014 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.

EUT was communicated with the simulator through Air interface, the simulator controls the EUT to transmitter the maximum power which defined in specification of product. The EUT operated on the typical channel.

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

The EUT was set in the shielded chamber and operated under nominal conditions.

4.2.2 Test Setup

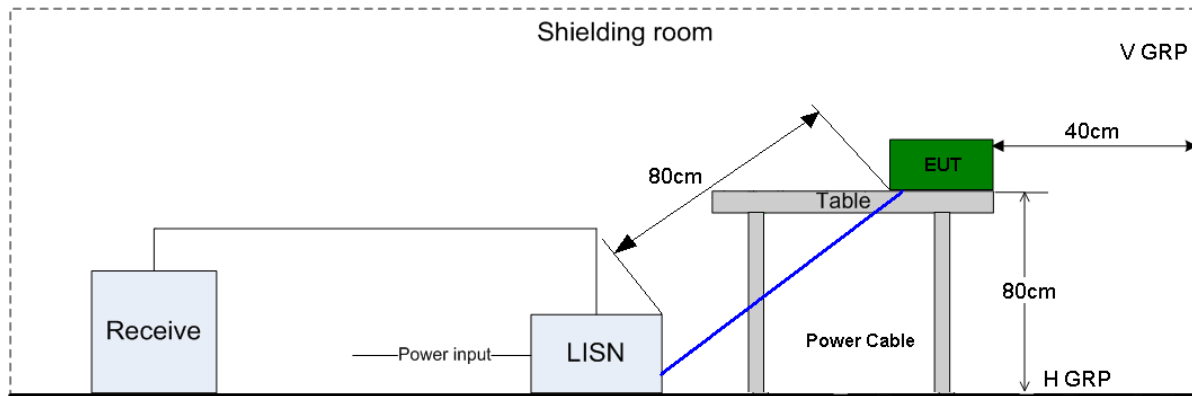


Figure 3. Test Set-up of conducted disturbance

4.2.3 Test Results

The EUT has met requirements for Conducted disturbance of power lines.

Refer to the section 7.2.1 of this report for test data.

Test Limit of AC Power Port		
Frequency range	150kHz ~ 30MHz	
Frequency	Voltage limits	
	QP (dB μ V)	AV (dB μ V)
0.15MHz~0.5MHz	66-56	56-46
0.5MHz-5MHz	56	46
5MHz~30MHz	60	50

5 Main Test Instruments

Main Test Equipments						
Test item	Test Instrument	Model	S/N	Manufacturer	Calibrated Deadline	Cal interval
RE	EMI Test receiver	ESU26	100150	R&S	Jan. 19, 2019	12
	Broadband Antenna	VULB 9163	9163-491	SCHWARZ BECK	Mar. 28, 2019	24
	Horn Antenna	HF906	100683	R&S	Mar. 28, 2019	24
CE	EMI Test receiver	ESU26	100150	R&S	May. 15, 2018	12
	Artificial Mains Network	ENV4200	100134	R&S	May. 15, 2018	12
	Artificial Mains Network	ENV216	100382	R&S	May. 15, 2018	12
Software Information						
Test Item	Software Name	Manufacturer		Version		
RE	EMC32	R&S		V9.25.0		
CE	EMC32	R&S		V9.25.0		

6 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty		
Items		Extended Uncertainty
RE(30MHz-1GHz)	Field strength (dB μ V/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dB μ V/m)	U=5.1dB; k=2
CE	Disturbance Voltage (dB μ V)	U=2.5dB; k=2

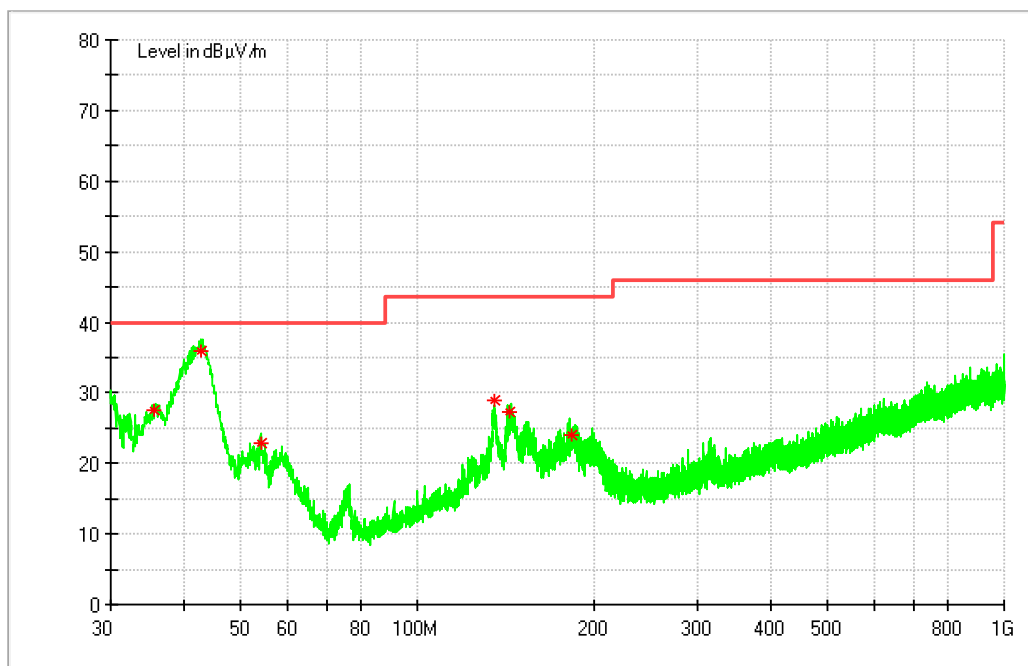
7 Test Data and Graph

Only the worst test results were shown

7.1 Radiated Disturbance

7.1.1 30MHz~1GHz

Test Mode 3: Charging + Video Playing +Earphone +idle



MEASUREMENT RESULT: QP Detector

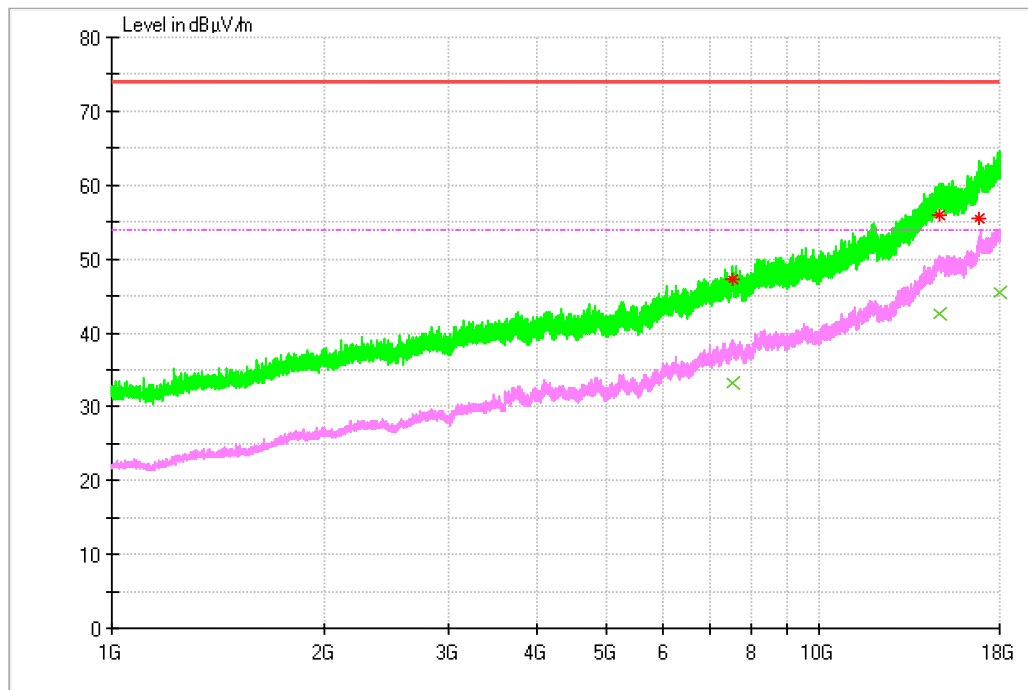
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
35.68178	27.43	16.1	40	12.57	101	292	H
42.80968	35.91	17.4	40	4.09	101	296	H
54.27208	22.95	11.5	40	17.05	100	39	H
135.2123	29.04	13.6	43.5	14.46	101	151	H
143.09696	27.4	13.2	43.5	16.10	101	176	H
183.06086	24.04	11.6	43.5	19.46	152	116	V

Note:

Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)
The reading level is calculated by software which is not shown in the sheet.

7.1.2 1GHz~18GHz

Test Mode 5: USB Copy(EUT with PC) +Earphone



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
7522.124	47.25	4.4	74	26.75	100	348	H
14775.78533	56.01	17.5	74	17.99	125	349	H
16846.08533	55.45	20.7	74	18.55	178	351	V

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
7544.671334	33.2	4.4	54	20.8	101	27	V
14822.89867	42.46	17.6	54	11.54	100	338	H
17959.24067	45.35	21.3	54	8.65	193	211	H

Note:

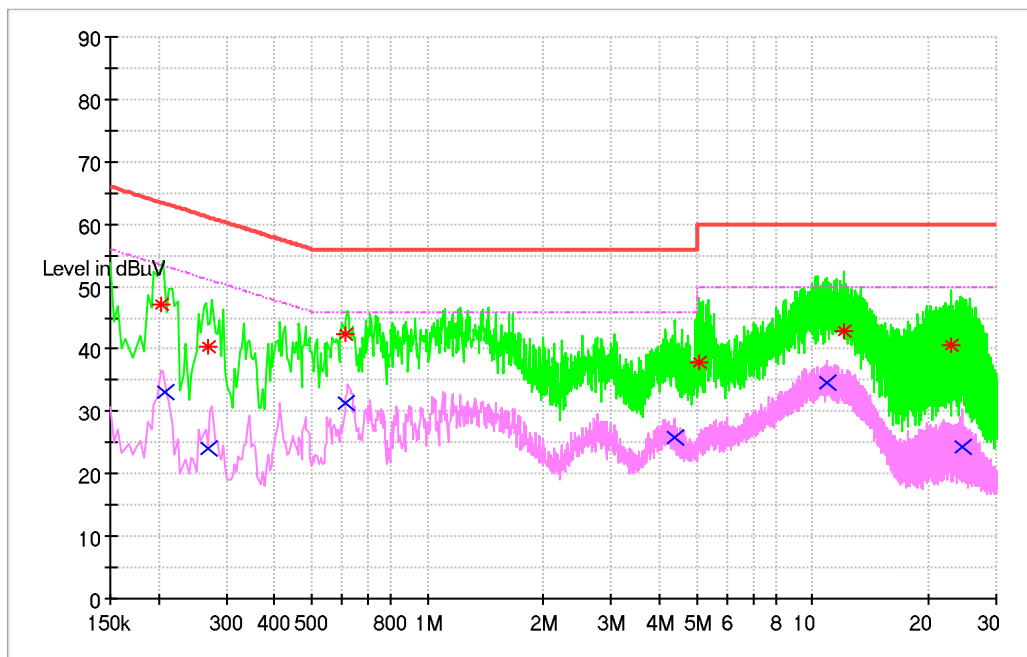
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

The reading level is calculated by software which is not shown in the sheet.

7.2 Conducted Disturbance

7.2.1 AC Port Test Data

Test Mode 1: Charging +traffic +WIFI+BT+GPS+NFC On +Earphone



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.202925	47.05	L1	9.7	16.44	63.49	FLO
0.269714	40.34	L1	9.7	20.79	61.13	FLO
0.613504	42.32	L1	9.7	13.68	56	FLO
5.086812	37.83	N	9.8	22.17	60	FLO
12.08552	42.88	L1	10	17.12	60	FLO
22.953828	40.6	L1	10.2	19.4	60	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.207294	33.08	N	9.7	20.23	53.31	FLO
0.269612	23.99	L1	9.7	27.14	51.13	FLO
0.613766	31.28	N	9.7	14.72	46	FLO
4.406538	25.7	L1	9.8	20.3	46	FLO
10.959455	34.67	L1	10	15.33	50	FLO
24.615414	24.32	L1	10.2	25.68	50	FLO

-----END-----