



EMC Test Report

Product Name: LTE CPE

Product Model: B310s-518

Report Number: SYBH(Z-EMC)20181207001001-2

FCC ID: QISB310S-518B

Reliability Laboratory of Huawei Technologies Co., Ltd.

(Global Compliance and Testing Center 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 for site 1 and L0570 for site 2.
2. The laboratory has passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01 for site 1 and 4353.01 for site 2.
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 “Global Compliance and Testing Centre 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 Certification rules. The Designation Number is CN1173 for site 1 and CN1210 for site 2, and the Test Firm Registration Number is 294140 for site 1 and 182947 for site 2.
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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: 2018-12-10
Start Date of Test: 2018-12-10
End Date of Test: 2018-12-17
Test Result: Pass

Approved By (Lab Manager)	2018-12-19	HeHao	He Hao
	Date	Name	Signature

Operator (Test Engineer)	2018-12-17	FengJinhua	Feng Jinhua
	Date	Name	Signature



Modification Record

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

TABLE OF CONTENT

1	General Information.....	6
1.1	EUT Description	6
1.2	Test Site Information.....	7
1.3	Applied Standards.....	7
2	Summary of Results.....	8
3	System Configuration during EMC Test	9
3.1	Test Mode	9
3.2	Test System Configuration	10
3.3	Cables Used during Test.....	11
3.4	Associated Equipment Used during Test	11
4	Electromagnetic Interference (EMI)	12
4.1	Radiated Disturbance 30MHz to 18GHz.....	12
4.2	Conducted Disturbance 0.15 MHz to 30MHz.....	15
5	Main Test Instruments	16
6	System Measurement Uncertainty	16
7	Test Data and Graph.....	17
7.1	Radiated Disturbance	17
7.2	Conducted Disturbance.....	21

1 General Information

1.1 EUT Description

EUT Description	
Product Name	LTE CPE
Model Number	B310s-518
Input voltage	12V 1A
TX Frequency	GSM 850: 824MHz To 849MHz GSM 1900: 1850MHz To 1910MHz WCDMA Band II: 1850MHz To 1910MHz WCDMA Band IV: 1710MHz To 1755MHz WCDMA Band V: 824MHz To 849MHz LTE Band II: 1850MHz To 1910MHz LTE Band IV: 1710MHz To 1755MHz LTE Band V: 824MHz To 849MHz LTE Band VII: 2500MHz To 2570MHz WIFI 2.4G: 2400MHz To 2483.5MHz
RX Frequency	GSM 850: 869MHz To 894MHz GSM 1900: 1930MHz To 1990MHz WCDMA Band II: 1930MHz To 1990MHz WCDMA Band IV: 2110MHz To 2155MHz WCDMA Band V: 869MHz To 894MHz LTE Band II: 1930MHz To 1990MHz LTE Band IV: 2110MHz To 2155MHz LTE Band V: 869MHz To 894MHz LTE Band VII: 2620MHz To 2690MHz WIFI 2.4G: 2400MHz To 2483.5MHz
S/N	B9K7S18B19000076
HW Version	WL1B310I
SW Version	21.300.01.00.00
EUT Accessory	
Adapter	Manufacture: Huawei Technologies Co.,Ltd. Model: HW-120100U01 Input voltage: 100-240V ~50/60Hz 0.5A Output voltage: 12V 1A S/N: U88905J3H03216 A75001GAR00002
External Antenna	Manufacturer: Huawei Technologies Co., Ltd. antenna gain: 1dBi
	Manufacturer: Huawei Technologies Co., Ltd. antenna gain: 3dBi

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 Test Site Information

Test Site 1:	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Test Site Location:	No.2 New City Avenue Songshan Lake Sci. &Tech. Industry Park, Dongguan, Guangdong, P.R.C
Test Site 2:	Shenzhen Academy of Information and Communications Technology
Test Site Location:	Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, People' s Republic of China 518000

1.3 Applied Standards

APPLIED STANDARD

47 CFR FCC Part 15 2016, Subpart B
ICES-003 Issue 5

2 Summary of Results

Summary of Results				
Test Items	Test Mode	Performance Class & Required Performance Criteria	Result	Site
<u>Radiated Emissions</u> Enclosure Port	Mode1	CLASS B	Pass	Site2
<u>Conducted Emissions</u> ☒ DC Power Port ☒ AC Power Port ☐ Telecommunication Ports	Mode1~Mode 2	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:	EUT with Adapter+ LAN+TEL+Wireless Service Idle Mode
Mode 2:	EUT with Adapter+ LAN+TEL+Wireless Service Traffic Mode

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.

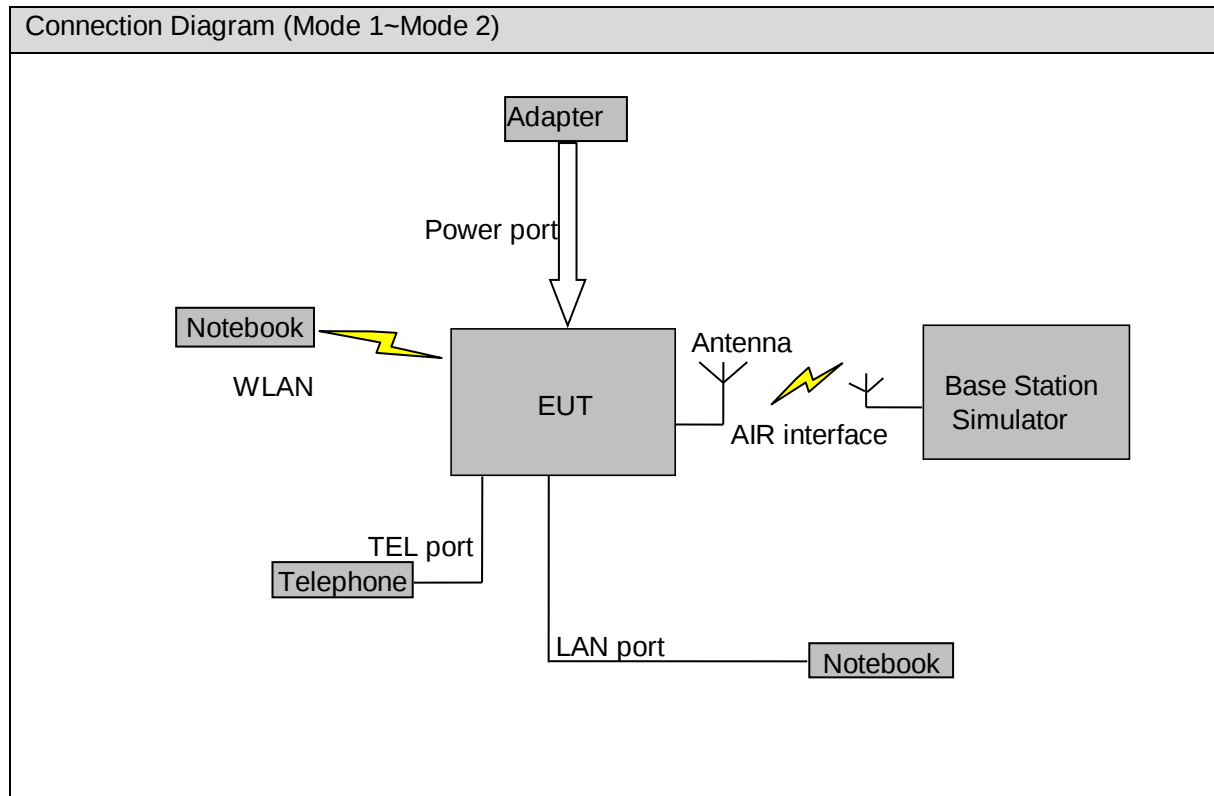
Idle Mode:

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

Worst Case:

- 1) Radiated Emission
Mode 2: Adapter (Model: HW-120100U01, SN: U88905J3H03216) + LAN+TEL+Wireless Service Idle Mode This result is the worst case.
- 2) Conducted Emission
Mode 2: Adapter (Model: HW-120100U01, SN A75001GAR00002) + LAN+TEL+Wireless Service Traffic Mode.This result is the worst case.

3.2 Test System Configuration



3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
AC Power	1	<3m	unshielded
LAN Cable	1	<3m	unshielded
Telephone Cable	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	3607111817	2019-3-14	12
Radio Communication tester	MT8820C	Anritsu	A110518805	2019-05-07	12
Notebook	X230	Lenovo	A130911985	N/A	N/A
Telephone	HCD8166T SD	HUAWEI	N/A	N/A	N/A

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: ANSI C63.4-2014. The test distance was 3m. The set-up and test methods were according to ANSI 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

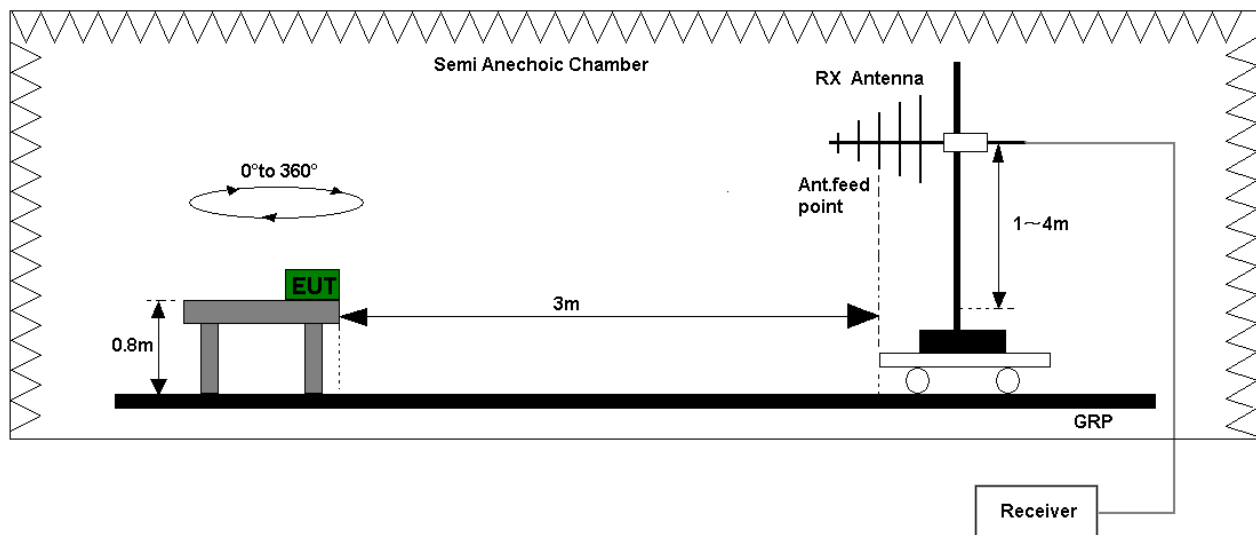


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

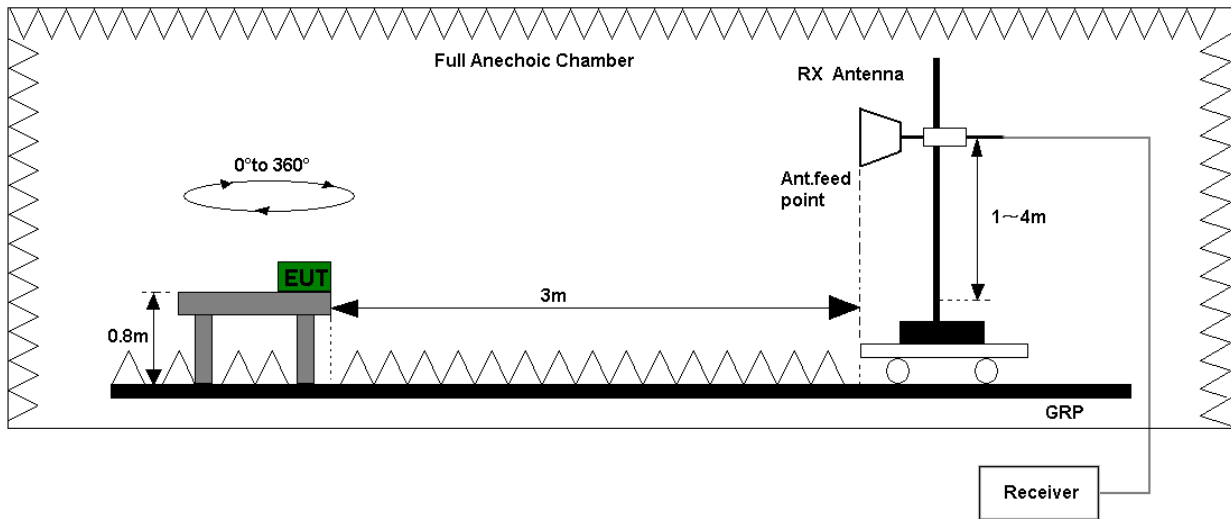


Figure 2 Test set-up of radiated disturbance(above 1GHz)

4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.
Refer to the section 7.1 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 ANSI 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

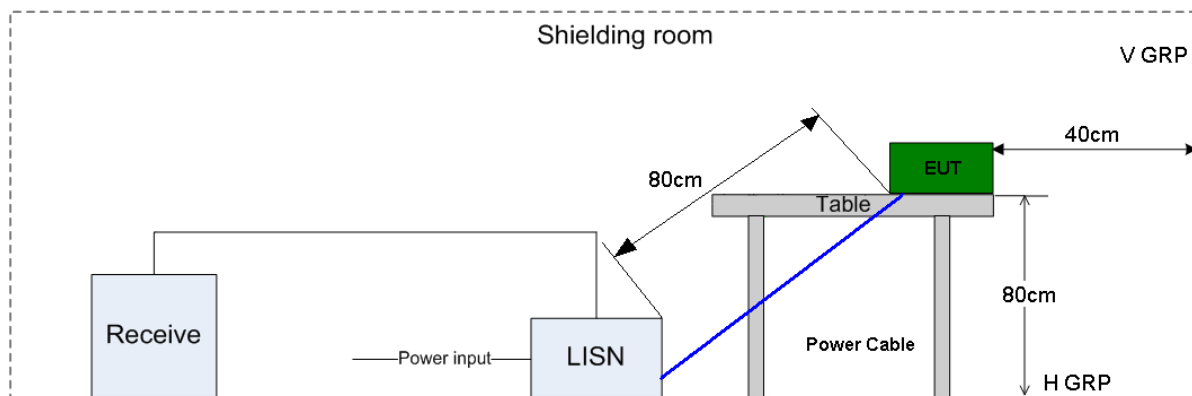


Figure 3. Test Set-up of conducted disturbance

4.2.3 Test Results

The EUT has met requirements for Conducted disturbance of power lines.
Refer to the section 7.2 of this report for test data.

Test Limit of AC Power Port		
Frequency range	150kHz ~ 30MHz	
Frequency	Voltage limits	
	QP (dBμV)	AV (dBμV)
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	ESR7	101675	R&S	Jul. 18, 2019	12
	Broadband Antenna	VULB 9163	9163-319	SCHWARZBECK	Feb. 27, 2020	24
	Horn Antenna	3117	66585	ETS-lindgren	May. 05, 2019	24
CE	EMI Test receiver	ESCI	101163	R&S	Jan. 18, 2019	12
	Artificial Mains Network	ENV4200	100134	R&S	May. 07, 2019	12
	Artificial Mains Network	ENV216	100382	R&S	May. 07, 2019	12
Software Information						
Test Item	Software Name	Manufacturer		Version		
RE	EMC32	R&S		V10.01.00		
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=5.12dB; k=2
RE(1GHz-18GHz)	Field strength (dB μ V/m)	U=4.48dB; k=2
CE	Disturbance Voltage (dB μ V)	U=2.3dB; k=2

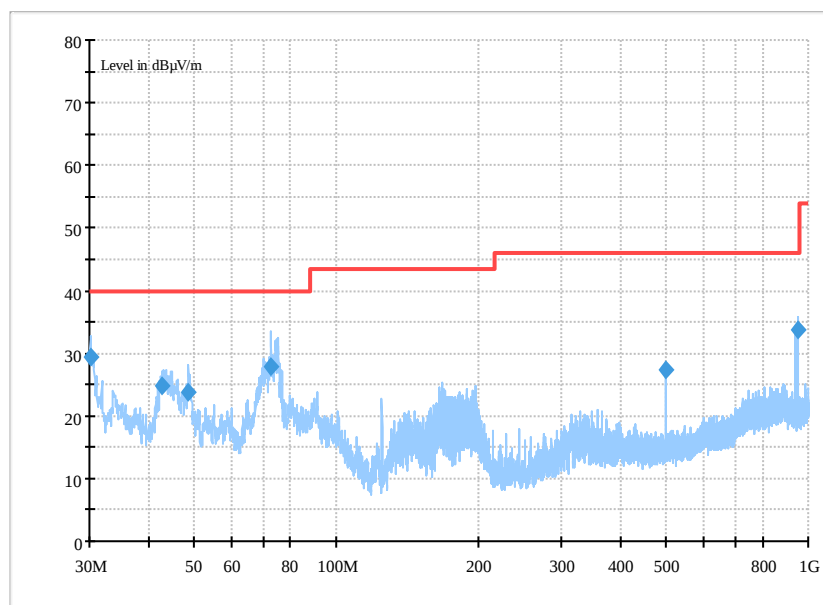
7 Test Data and Graph

Only the worst test results were shown

7.1 Radiated Disturbance

7.1.1 30MHz~1GHz

Test Mode:EUT with Adapter+ LAN+TEL+Wireless Service Idle Mode



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.215556	29.36	-25.7	40.00	10.64	100.0	194.0	V
42.771667	24.78	-23.2	40.00	15.22	100.0	194.0	V
48.645556	23.89	-22.9	40.00	16.11	100.0	164.0	V
72.841667	27.81	-28.0	40.00	12.19	100.0	187.0	V
499.965000	27.41	-16.5	46.00	18.59	100.0	328.0	H
953.601667	33.80	-10.0	46.00	12.20	100.0	279.0	V

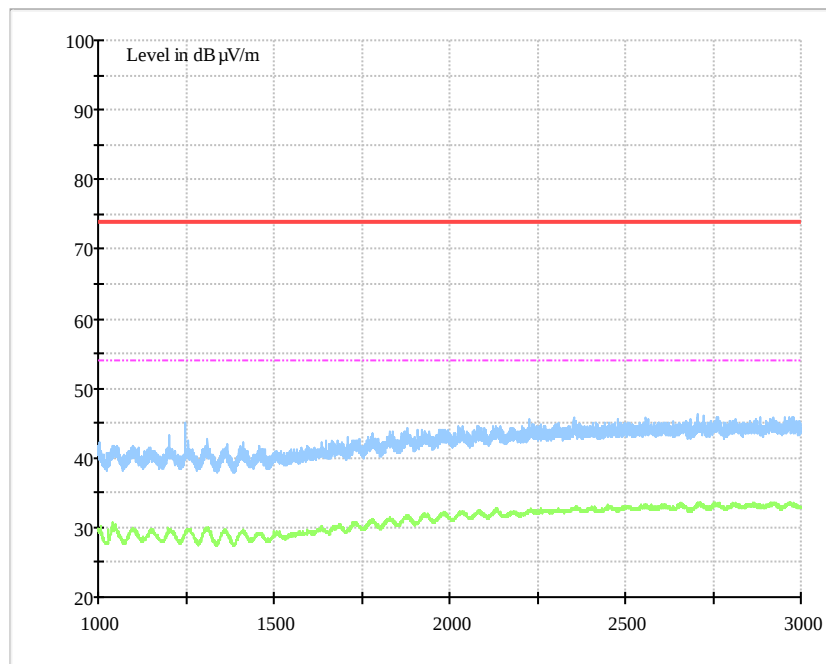
Note:

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

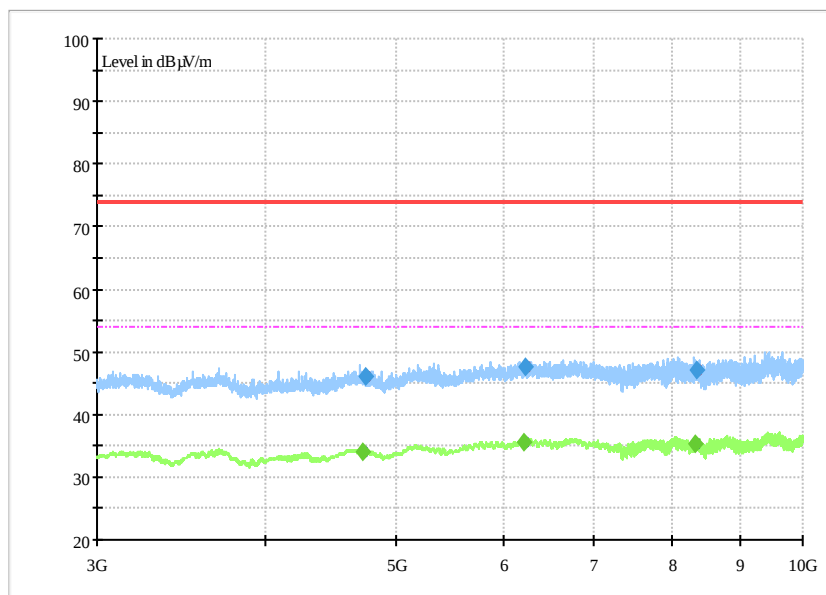
The reading level is calculated by software which is not shown in the sheet.

7.1.2 1GHz~18GHz

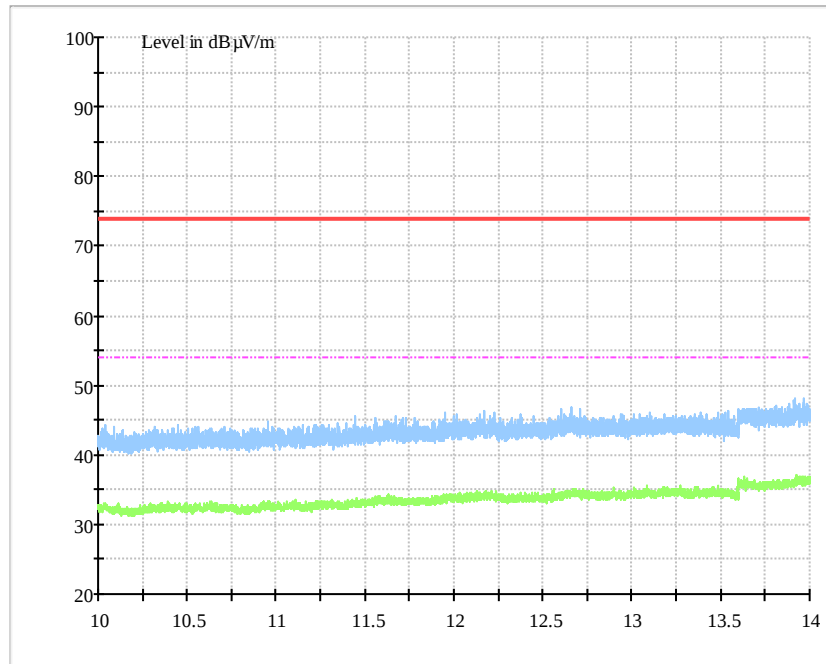
Test Mode: EUT with Adapter+ LAN+TEL+Wireless Service Idle Mode



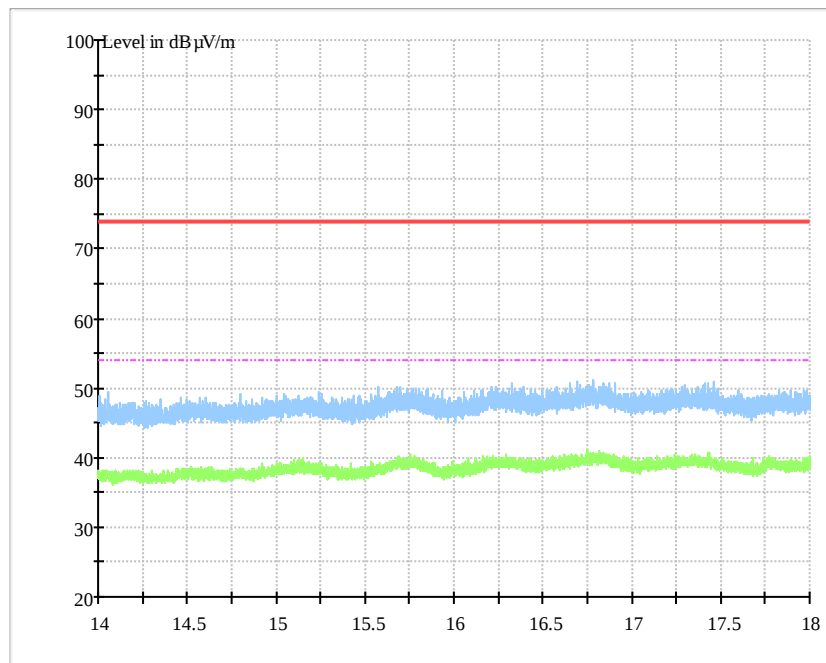
1GHz~3GHz



3GHz~10GHz



10GHz~14GHz



14GHz~18GHz

MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
4741.250000	46.05	7.8	74.00	19.95	100	205	V
6229.625000	47.55	8.8	74.00	18.51	100	326	H
8345.375000	47.03	9.2	74.00	18.70	100	0	V

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
4722.875000	34.05	7.7	54.00	19.95	100	240	V
6219.125000	35.49	8.9	54.00	18.51	100	99	V
8330.500000	35.30	9.2	54.00	18.70	100	240	V

Note:

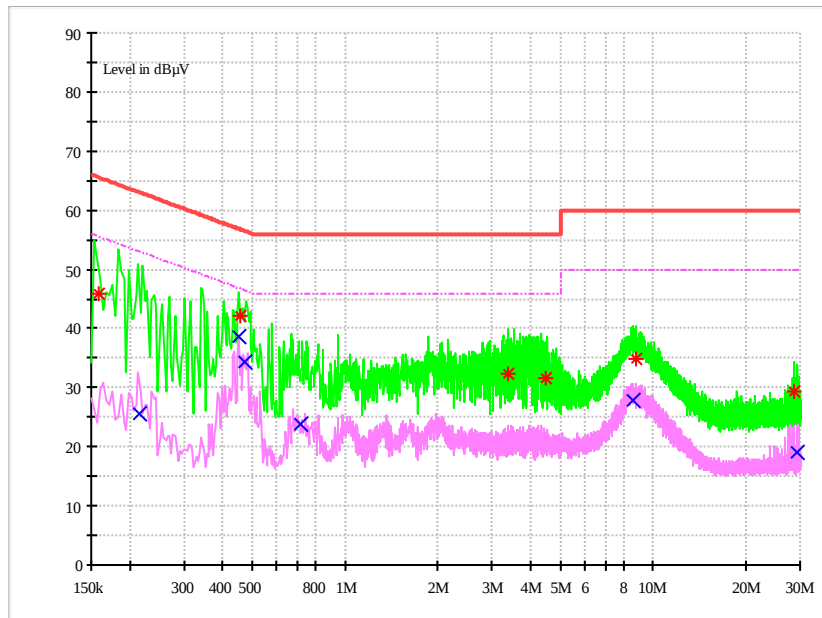
Level =Reading level by receiver + Transd (Antenna factor + cable loss – preamplifier gain)

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

7.2 Conducted Disturbance

7.2.1 AC Port Test Data

Test Mode: EUT with Adapter+ LAN+TEL+Wireless Service Traffic Mode



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.158687	45.89	L1	9.7	19.64	65.53	FLO
0.457496	42.06	L1	9.7	14.68	56.74	FLO
3.386257	32.22	N	9.8	23.78	56	FLO
4.458053	31.53	N	9.8	24.47	56	FLO
8.827006	34.93	L1	9.9	25.07	60	FLO
28.743653	29.31	N	10.4	30.69	60	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Line	Transd dB	Margin dB	Limit dBμV	PE
0.214754	25.53	N	9.7	27.49	53.02	FLO
0.452231	38.7	L1	9.7	8.65	47.35	FLO
0.47485	34.25	L1	9.7	12.18	46.43	FLO
0.715318	23.93	L1	9.7	22.07	46	FLO
8.654749	27.76	N	9.9	22.24	50	FLO
29.229094	19.13	N	10.4	30.87	50	FLO

-----END-----