EMC Test Report

Product Name: LTE CPE

Model Number: B593u-12

Report No: SYBH(Z-EMC)018052012-2

FCC ID：QISB593U-12

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

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Notice

1. **The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.**
2. **The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.**
3. **The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-2.**
4. **The test report is invalid if not marked with "exclusive stamp for the test report".**
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6. **The test report is invalid if there is any evidence of erasure and/or falsification.**
7. **If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.**
8. **Normally, the test report is only responsible for the samples that have undergone the test.**
9. **Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.**

Applicant:	Huawei Technologies Co., Ltd.
Address:	Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
Date of Receipt Test Item:	Apr.28, 2012
Start Date of Test:	May.02, 2012
End Date of Test:	May.08, 2012
Test Result:	Pass

Approved By (Lab Manager)	**2012-05-10**	**Liuchunlin**	
	Date	**Name**	**Signature**
Operator	**2012-05-10**	**Liuqingbin**	
	Date	**Name**	**Signature**

Modification Record

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

TABLE OF CONTENT

1 General Information

1.1 EUT Description

EUT Description	
Product Name	LTE CPE
Model Number	B593u-12
Serials Number	N4Y7NA1231500032
Working Voltage	12Vdc
TX Frequency	GSM850: 824MHz To 849MHz PCS1900: 1850MHz To 1910MHz WIFI: 2400MHz To 2473MHz
RX Frequency	GSM850: 869MHz To 894MHz PCS1900: 1930MHz To 1990MHz WIFI: 2400MHz To 2473MHz
HW Version	Router Board: B593RW2A Modem Board:MD1EM92012UM
SW Version	V100R001
EUT Accessory	
Data cable	Manufacturer: Huawei Technologies Co., Ltd. Data Cable USB A Male to USB B Female 18cm,Black,
Adapter	Manufacture: Huntkey Model: HW-120200U1W Input voltage: 100V-240V~50/60Hz，0.8A Output voltage: 12V ⎓ 2A S/N:2102220121AAB4000182
Adapter	Manufacture: Dongguan Shilong Fuhua Electronic Co., Ltd. Model: HW-120200U1W Input voltage: 100V-240V~50/60Hz，0.8A Output voltage: 12V ⎓ 2A S/N:2102220121ARC4000005

Remark: The information of the EUT is declared by the manufacturer. Please refer to the specifications or user manual for details.

1.2 Test Site Information

Test Site 1:	RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD.
Test Site Location:	Bantian Longgang District Shenzhen, P.R. China

1.3 Applied Standards

APPLIED STANDARD

47 CFR FCC Part 15:2011, Subpart B

2 Summary of Results

Summary of Results				
Test Items	**Test Mode**	**Performance Class & Required Performance Criteria**	**Result**	**Site**
Radiated Emissions Enclosure Port	Mode2	CLASS B	Pass	Site1
Conducted Emissions ☐DC Power Port ☒AC Power Port ☐Telecommunication Ports	Mode1	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 + Adapter charging+ LAN + PHONE + USB + Wireless Service traffic
Mode 2:	EUT + Adapter charging+ LAN + PHONE + USB + Wireless Service IDLE

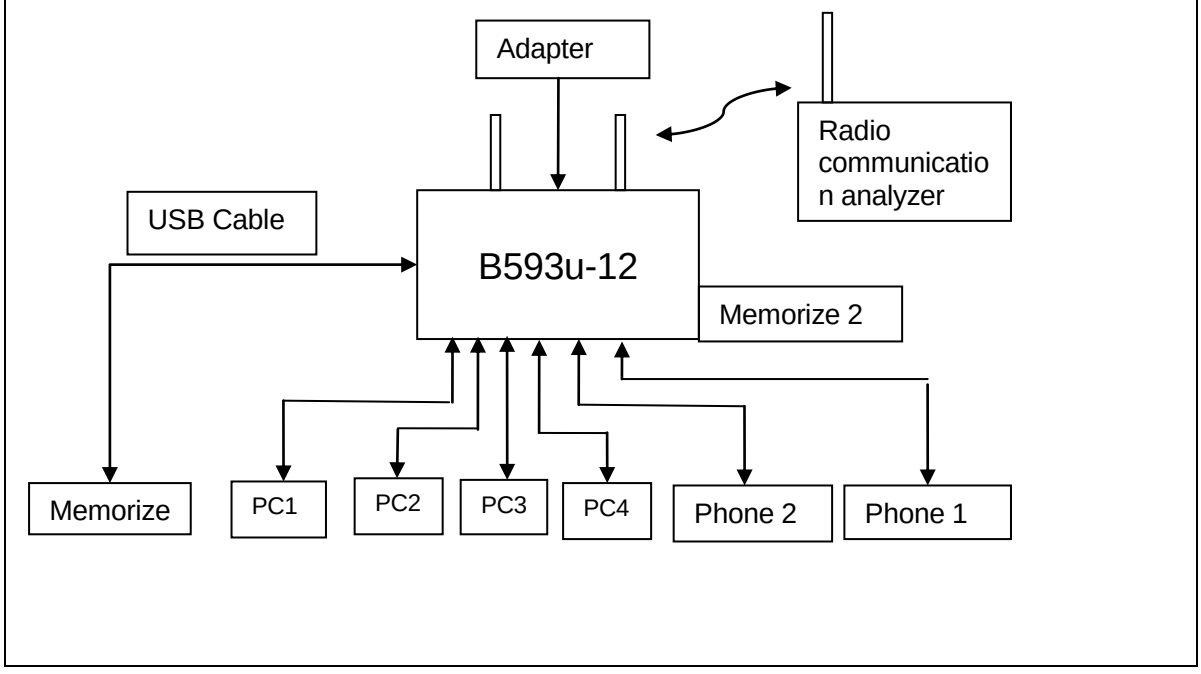
Remark：If there is more than one adapter, each one should be applied throughout the compliance test respectively, however, only the worst case will be recorded in this report.
LAN: transmission data (PC1 ping PC2, PC3, PC4)
PHONE: phone 1 call phone 2
USB: data copy (from EUT to memorize)

Traffic Mode:
State of EUT when switched on and with Radio Resource Control (RRC) connection established

Idle Mode:
State of EUT when switched on but with no Radio Resource Control (RRC) connection

3.2 Configurations of Test System

Connection Diagram (Mode 1 and Mode 2)



3.3 Cables Used during Test

Cable	Quantity	Length	Type of Cable
AC Power	2	<3m	Unshielded
USB	1	<3m	shielded
LAN Cable	4	<3m	Unshielded
Phone Cable	2	<3m	Unshielded

3.4 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline
Radio Communication Tester	CMU200	R&S	3607111817	2012-7-23
Notebook	D630	DELL	0W7349	N/A
Memorizer	/	R&S	/	N/A
Memorizer	/	SANDISK	/	N/A
PHONE	HCD8188	COMIX	/	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 C63.4-2009. The test distance was 3m.The set-up and test methods were according to ANSI C63.4-2009.
A preliminary scan and a final scan of the emissions were made from 30 MHz to18 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 receive antenna has two polarizations V and H.
EUT was configured in idle mode and the test performed at the worst emission state.

Receiver Setting		
Frequency(MHz)	RBW(kHz)	VBW(kHz)
30-1000	120	300
Above 1000	1000	3000

4.1.2 Test setup

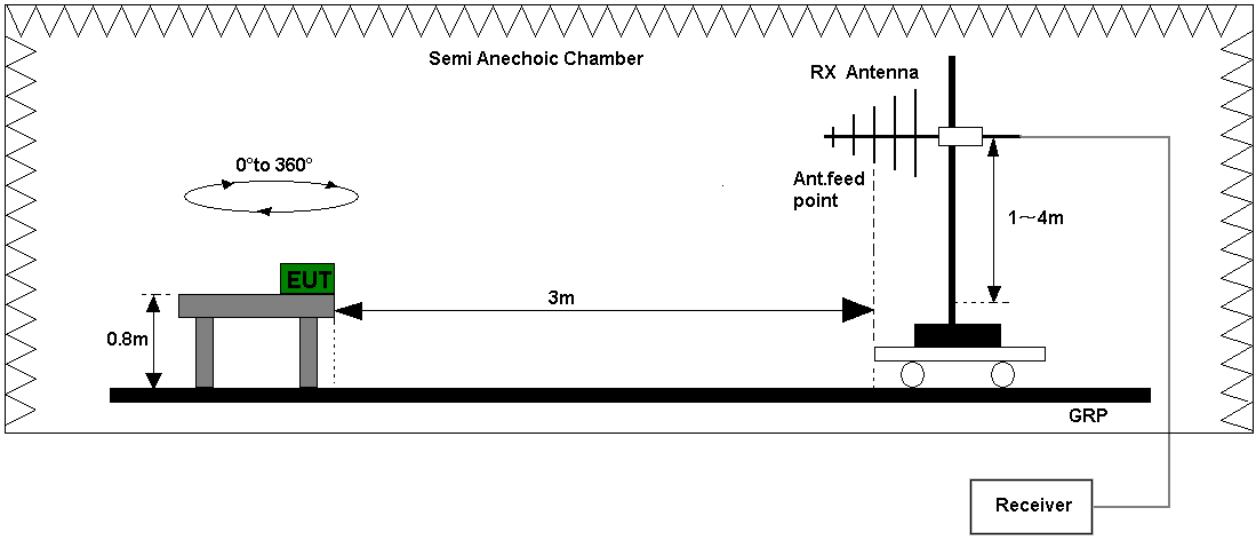


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

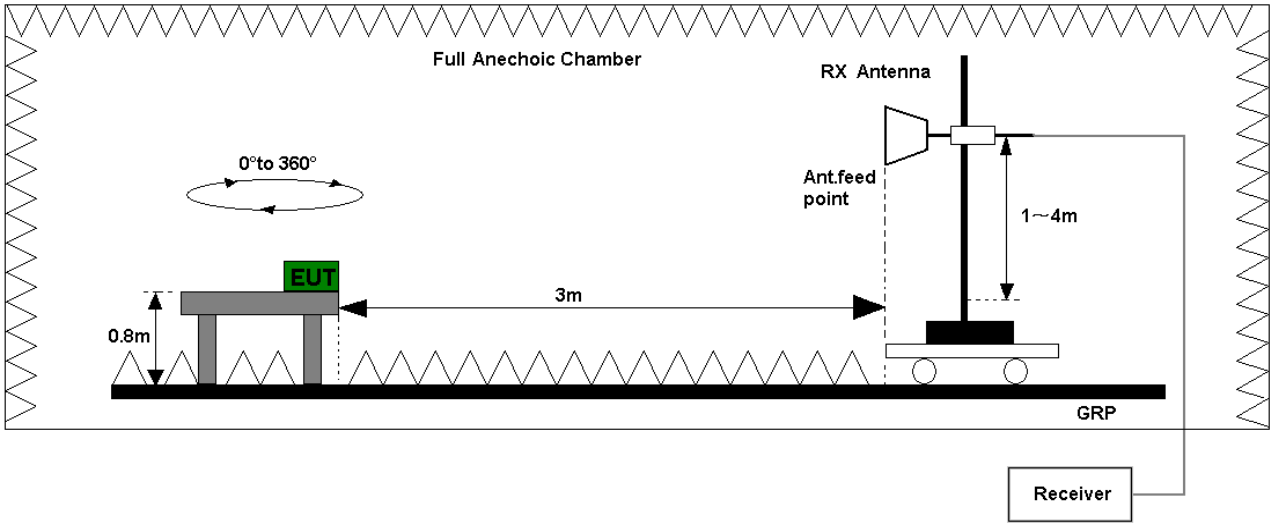


Figure 2. Test set-up of radiated disturbance(above 1GHz)

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(μV/m)		Unit(dBμV/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 C63.4-2009.
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.
The 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 150kz to 30 MHz: 9 kHz;
The Mobile Station was setup in the shielded chamber and operated under nominal conditions.

4.2.2 Test Setup

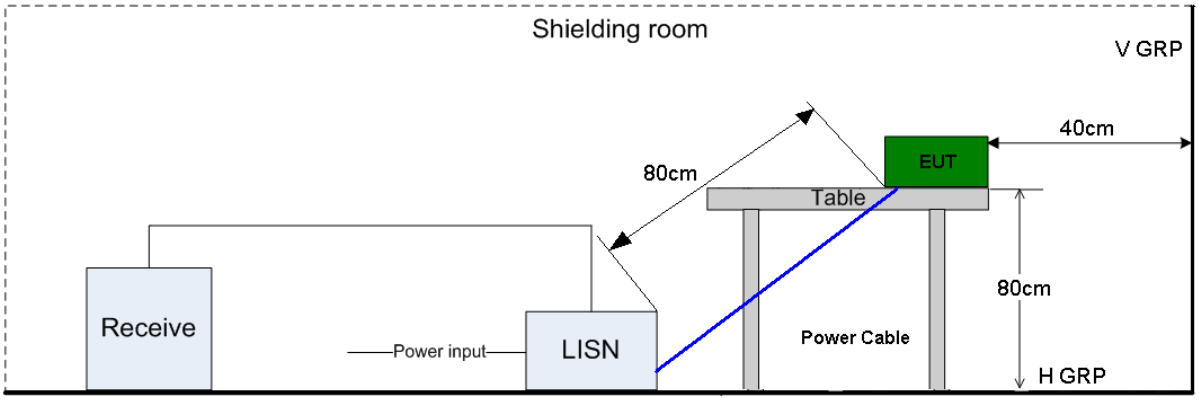


Figure 3. Test Set-up of conducted disturbance

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**	**Due date**	**Cal interval**
RE	EMI Test receiver	ESU26	100150	R&S	May.29, 2012	12
	Broadband Antenna	VULB 9163	9163-941	SCHWARZBECK	May.15, 2013	24
	Horn Antenna	HF906	100683	R&S	May.15, 2013	24
CE	Artificial Mains Network	ENV216	100382	R&S	Mar.21, 2013	12
	Artificial Mains Network	EN4200	100134	R&S	Mar.05, 2013	12
	EMI Test receiver	ESCI	101163	R&S	Mar.05, 2013	12

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	ES-K1	R&S	V1.7.1
CE	EMC32	R&S	V8.52.0

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:

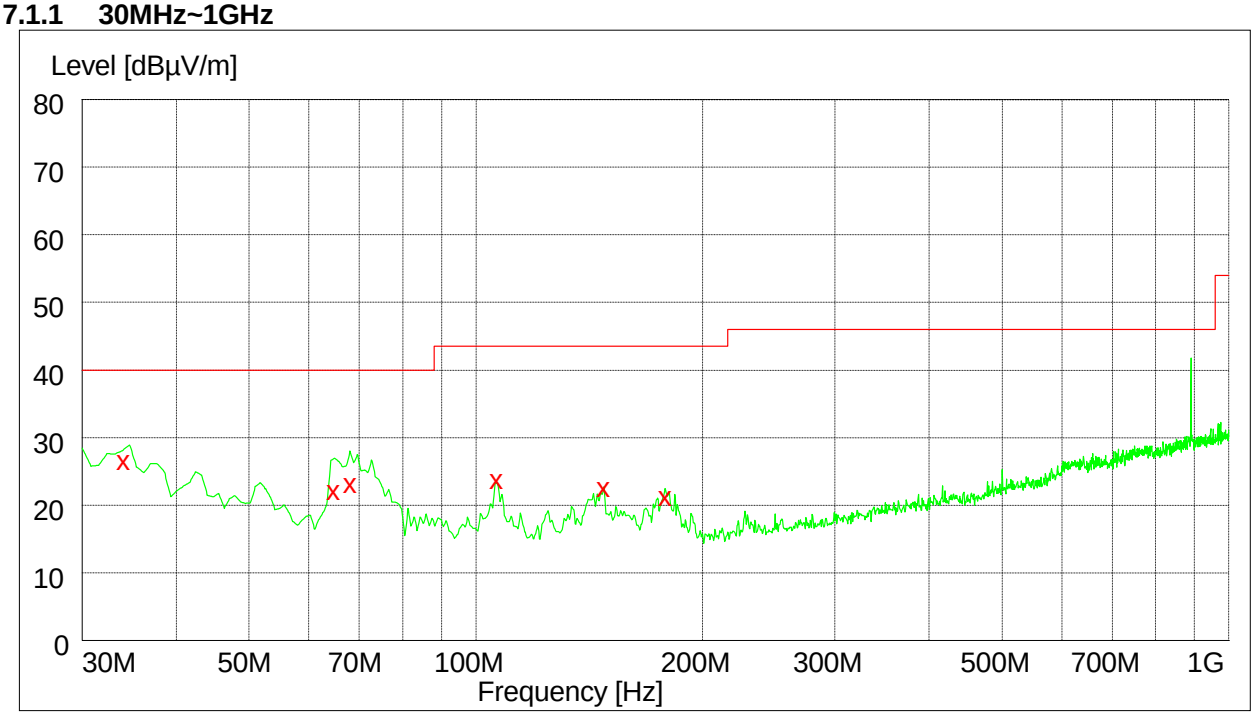
System Measurement Uncertainty		
Items		**Extended Uncertainty**
RE(30MHz-1GHz)	Field strength (dBμV/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dBμV/m)	U=5.1dB; k=2
CE	Disturbance Voltage (dBμV)	U=2.6dB; k=2

7 Graph and Test Data

Only the worst test results were shown

7.1 Radiated Disturbance

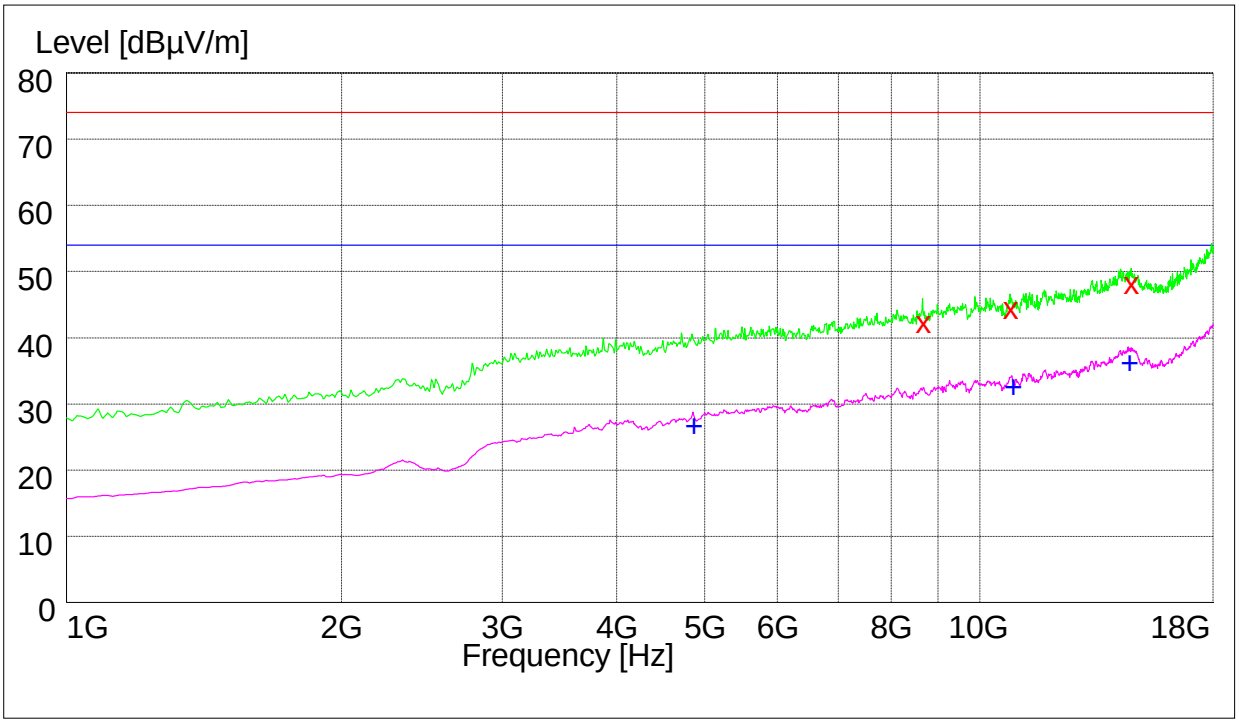
7.1.1 30MHz~1GHz



MEASUREMENT RESULT: QP Detector

Frequency	Level	Transducer	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
34.080000	26.70	14.9	40.0	13.3	100.0	354.00	VERTICAL
64.800000	21.30	11.8	40.0	18.7	100.0	266.00	VERTICAL
68.220000	22.90	11.2	40.0	17.1	100.0	94.00	VERTICAL
106.740000	24.70	13.3	43.5	18.8	100.0	143.00	VERTICAL
148.140000	21.60	9.8	43.5	21.9	100.0	16.00	VERTICAL
178.560000	20.70	11.2	43.5	22.8	100.0	321.00	VERTICAL

7.1.2 1GHz~18GHz



MEASUREMENT RESULT: PK Detector

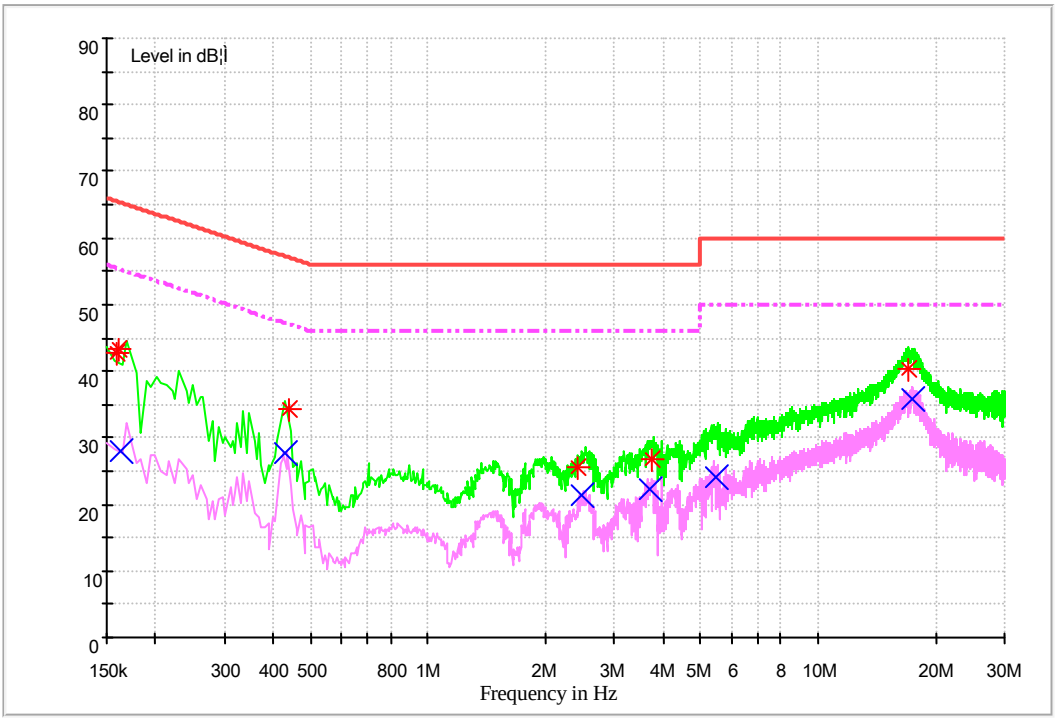
Frequency	Level	Transducer	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
8663.500000	42.30	5.6	74.0	31.7	200.0	178.00	HORIZONTAL
10797.500000	43.70	9.0	74.0	30.3	121.0	270.00	HORIZONTAL
14645.000000	48.30	14.3	74.0	25.7	149.0	145.00	VERTICAL

MEASUREMENT RESULT: AV Detector

Frequency	Level	Transducer	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
4852.500000	26.90	-2.6	54.0	27.1	100.0	37.00	VERTICAL
10837.500000	31.60	9.7	54.0	22.4	200.0	189.00	VERTICAL
14524.000000	35.70	14.5	54.0	18.3	174.0	356.00	HORIZONTAL

7.2 Conducted Disturbance

7.2.1 AC Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency	Level	Transducer	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.159281	42.6	9.7	65.5	22.9	N	FLO
0.160879	43.3	9.7	65.4	22.1	N	FLO
0.437472	34.4	9.7	57.1	22.7	N	FLO
2.428154	25.7	9.7	56.0	30.3	L1	FLO
3.760920	26.7	9.8	56.0	29.3	L1	FLO
17.038222	40.4	10.1	60.0	19.6	N	FLO

MEASUREMENT RESULT: AV Detector

Frequency	Level	Transducer	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.163147	27.8	9.7	55.3	27.5	N	FLO
0.431534	27.8	9.7	47.2	19.4	N	FLO
2.465928	21.3	9.7	46.0	24.7	L1	FLO
3.685842	22.3	9.8	46.0	23.7	L1	FLO
5.485103	24.1	9.8	50.0	25.9	L1	FLO
17.392110	36.0	10.1	50.0	14.0	N	FLO

--------**END**----------