



# FCC EMC Test Report

**Product Name: LTE 2D USB Rotator**

**Model Number: E397Bu-502**

**Report No: SYBH(Z-EMC)077042012-2**

**FCC ID: QISE397BU-502**

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

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## Notice

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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.
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**Applicant:** Huawei Technologies Co., Ltd.  
**Address:** Huawei Base, Bantian, Longgang District,  
 Shenzhen 518129, P.R. China

**Date of Receipt Test Item:** Apr.12,2012  
**Start Date of Test:** Apr.13,2012  
**End Date of Test:** Apr.20,2012

**Test Result:** Pass

<b>Approved By (Lab Manager)</b>	<u>2012-04-26</u> Date	<u>Liuchunlin</u> Name	<u><i>Liuchunlin</i></u> Signature
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<b>Operator</b>	<u>2012-04-26</u> Date	<u>Daniel</u> Name	<u><i>Daniel</i></u> Signature
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## TABLE OF CONTENT

1	General Information.....	5
1.1	EUT Description.....	5
1.2	Test Site Information.....	6
1.3	Applied Standard.....	6
2	Summary of Results .....	7
3	System Configuration during EMC Test.....	8
3.1	Test Mode .....	8
3.2	Configurations of Test System.....	8
3.3	Associated Equipment Used during Test .....	9
4	Electromagnetic Interference (EMI).....	10
4.1	Radiated Disturbance 30MHz to 18GHz.....	10
4.2	Conducted Disturbance 0.15 MHz to 30MHz.....	12
5	Main Test Instruments.....	13
6	System Measurement Uncertainty .....	13
7	Graph and Data of Emission Test.....	14
7.1	Radiated Disturbance .....	14
7.2	Conducted Disturbance .....	16

## 1 General Information

### 1.1 EUT Description

EUT Description	
Product Name	LTE 2D USB Rotator
Model Number	E397Bu-502
Serials Number	P2S01A9230600011
TX Frequency	CDMA/EVDO 800: 824 MHz To 849MHz CDMA/EVDO 1900: 1850 MHz To 1910MHz CDMA/EVDO 1700: 1710 MHz To 1755MHz LTE Band 2: 1850MHz To 1910MHz LTE Band 4: 1710MHz To 1755MHz LTE Band 5: 824MHz To 849MHz LTE Band 12: 699MHz To 716MHz
RX Frequency	CDMA/EVDO 800: 869 MHz To 894MHz CDMA/EVDO 1900: 1930 MHz To 1990MHz CDMA/EVDO 1700: 2110 MHz To 2155MHz LTE Band 2: 1930MHz To 1990MHz LTE Band 4: 2110MHz To 2155 MHz LTE Band 5: 869MHz To 894MHz LTE Band 12: 729MHz To 746MHz
HW Version	CD2E397UM
SW Version	11.515.05.00.000
EUT Accessory	
USB Cable	Quantity: 1 Length: <3m Type of Cable: shielded

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



## 1.2 Test Site Information

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

## 1.3 Applied Standard

APPLIED STANDARD	
	47 CFR FCC Part 15:2010, 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 Mode4	CLASS B	Pass	Site1
Conducted Emissions <input checked="" type="checkbox"/> DC Power Port <input checked="" type="checkbox"/> AC Power Port <input type="checkbox"/> Telecommunication Ports	Mode1 Mode3	CLASS B	Pass	Site1
Note: 1, Measurement taken is within the measurement uncertainty of measurement system. 2, <input checked="" type="checkbox"/> The item has been tested; <input type="checkbox"/> 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

Huawei has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was in this test report and defined as:

Test Mode	
Mode 1:	USB Copy(EUT with PC)+ Traffic
Mode 2:	USB Copy(EUT with PC)+Idle
Mode 3:	USB Cable + USB Copy(EUT with PC)+ Traffic
Mode 4:	USB Cable + USB Copy(EUT with PC)+Idle

Remark: When the EUT have multiple Data cable, need separate test with Data cable. Here only the worst cases are recorded in this report.

USB Copy:

State of EUT when transferred the data between the EUT and PC

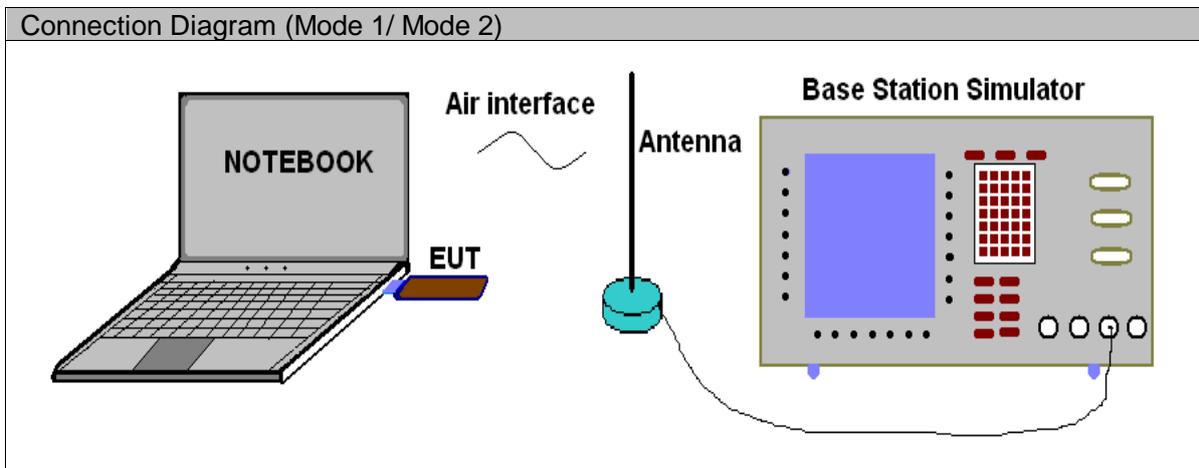
Traffic Mode:

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

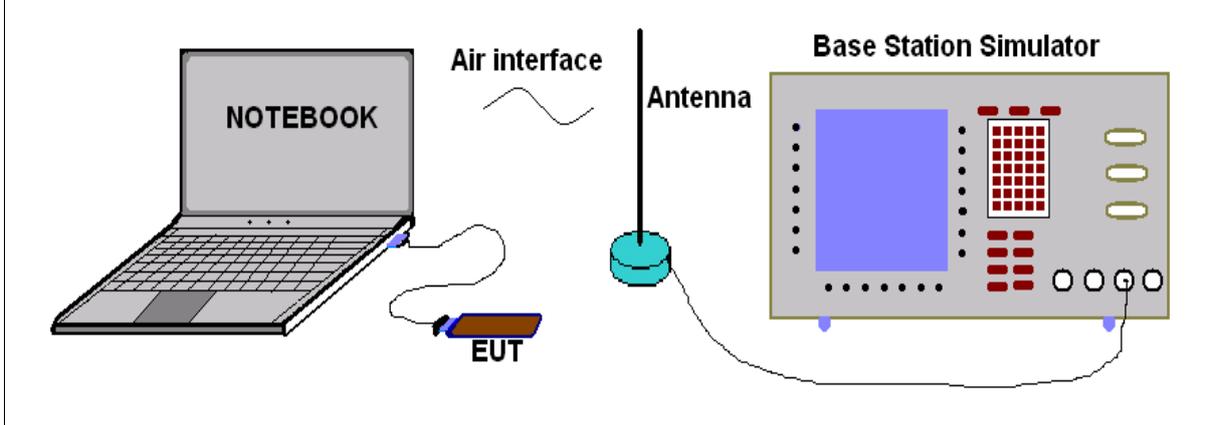
Idle Mode:

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

#### 3.2 Configurations of Test System



Connection Diagram (Mode 3/ Mode 4)



### 3.3 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Calibrated Deadline
Radio Communication Tester	CMU200	R&S	3608105673	2012-11-06
Radio Communication Analyzer	MT8820C	ANRITSU	6200971028	2013-03-30
Notebook	D81	DELL	3108060273	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 30MHz to 18GHz 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 worst emission state.

#### 4.1.2 Test setup

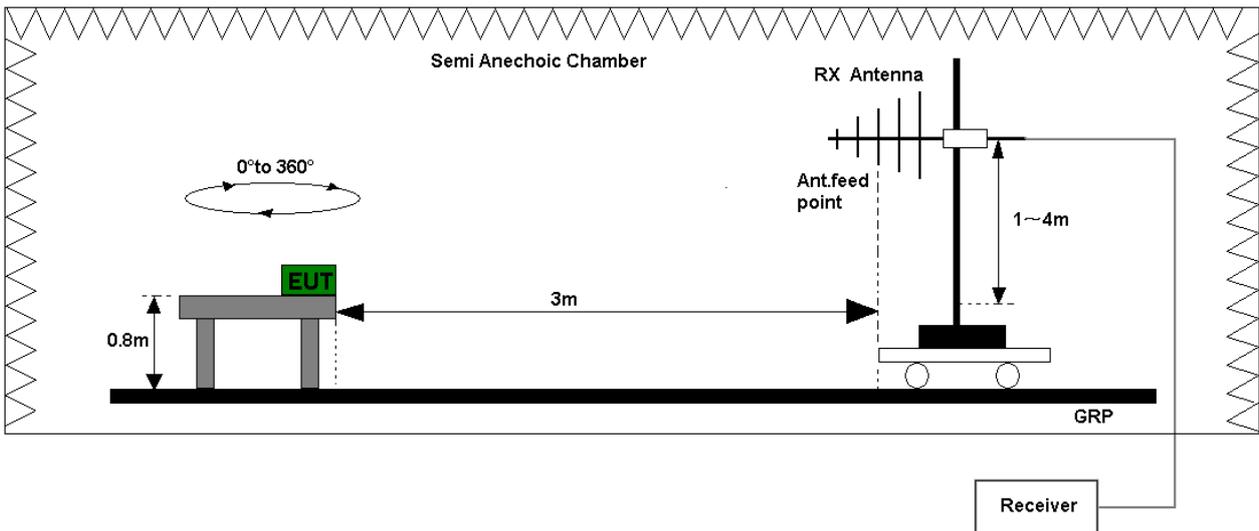


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz)

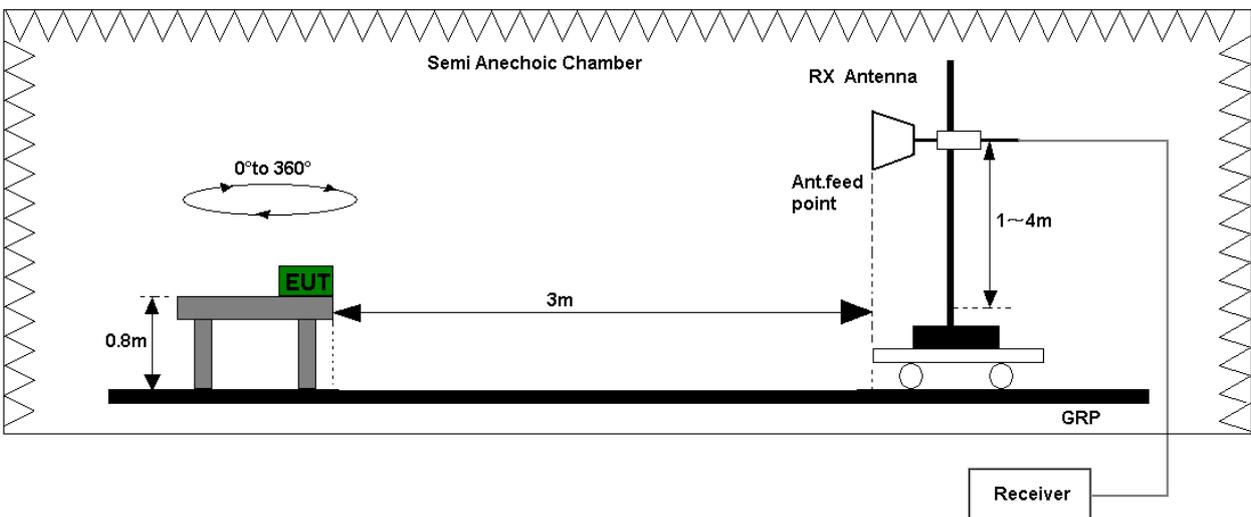


Figure 2. Test set-up of radiated disturbance(above 1GHz)

### 4.1.3 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port.  
The test data see section 7.1 of this report.

Test Limits				
Frequency of Emission (MHz)	Radiated Limit			
	Unit( $\mu$ V/m)		Unit(dB $\mu$ 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 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm 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.

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 150kHz to 30 MHz: 9 kHz;

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

### 4.2.2 Test Setup

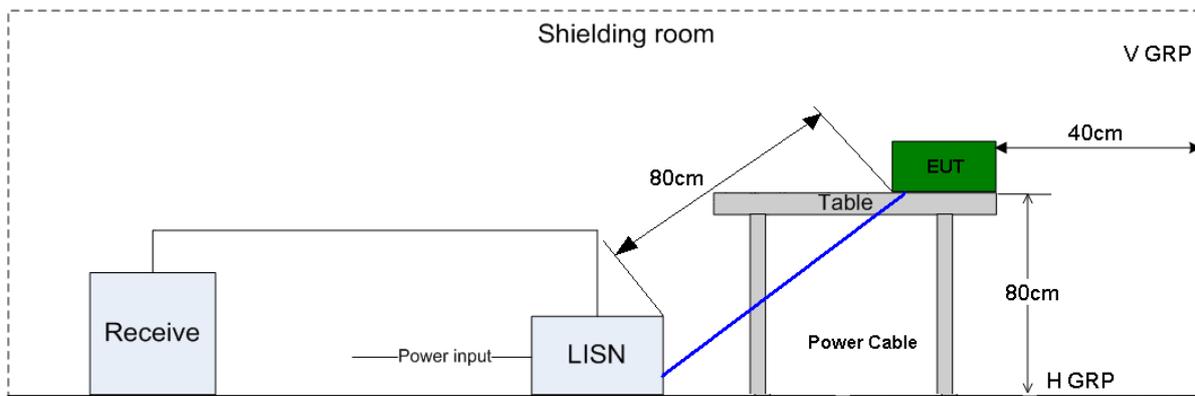


Figure 3. Test Set-up of conducted disturbance

### 4.2.3 Test Results

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

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

## 5 Main Test Instruments

Main Test Equipments					
Test item	Test Instrument	Model	S/N	Manufacturer	Calibrated Deadline
RE	EMI Test receiver	ESU26	100150	R&S	May.29, 2012
	Broadband Antenna	VULB 9163	9163-941	SCHWARZBECK	May.15, 2012
	Horn Antenna	HF906	100683	R&S	May.15, 2012
CE	EMI Test receiver	ESCI	101163	R&S	Mar. 05, 2013
	Artificial Mains Network	ENV216	100382	R&S	May.29, 2012
Software Information					
Test Item	Software Name	Manufacturer		Version	
RE	ES-K1	R&S		1.7.1	
CE	EMC32	R&S		8.52.0	

## 6 System Measurement Uncertainty

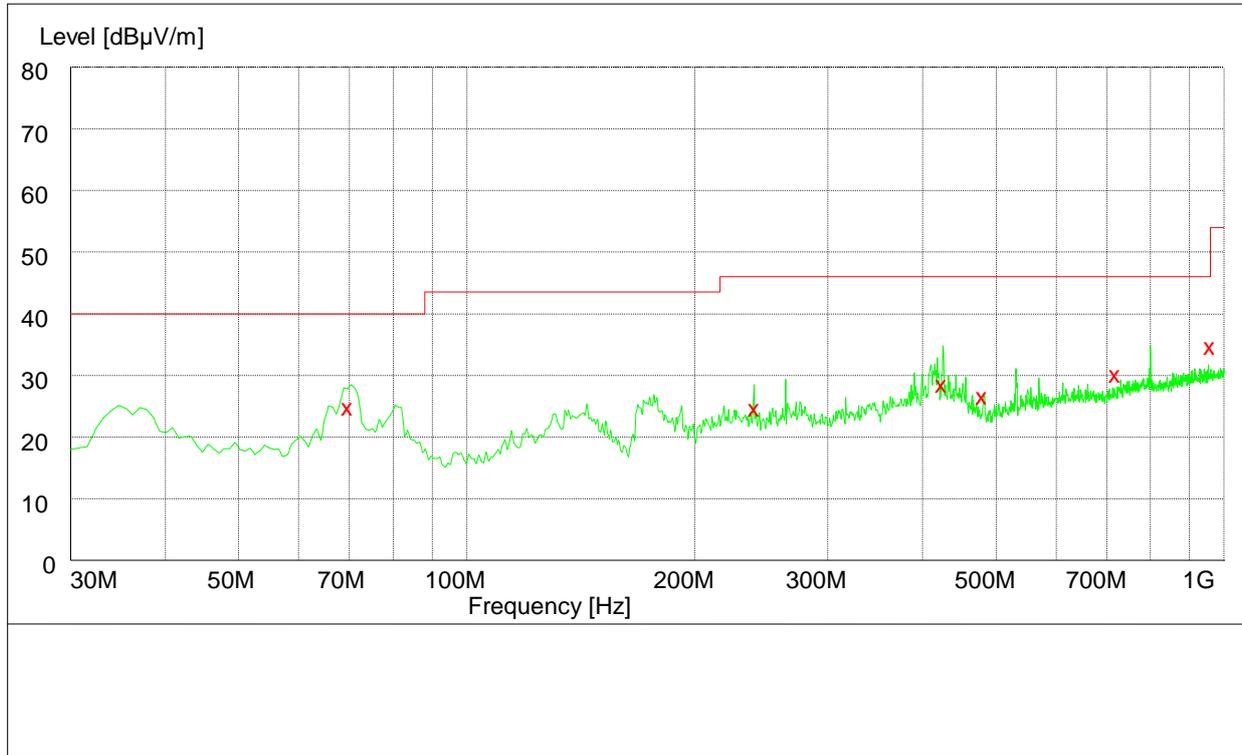
For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty		
Items	Extended Uncertainty	
RE(30MHz-1GHz)	Field strength (dB $\mu$ V/m)	U=4.1dB; k=2
RE(1GHz-18GHz)	Field strength (dB $\mu$ V/m)	U=5.0dB; k=2
CE	Disturbance Voltage (dB $\mu$ V)	U=2.6dB; k=2

## 7 Graph and Data of Emission Test

### 7.1 Radiated Disturbance

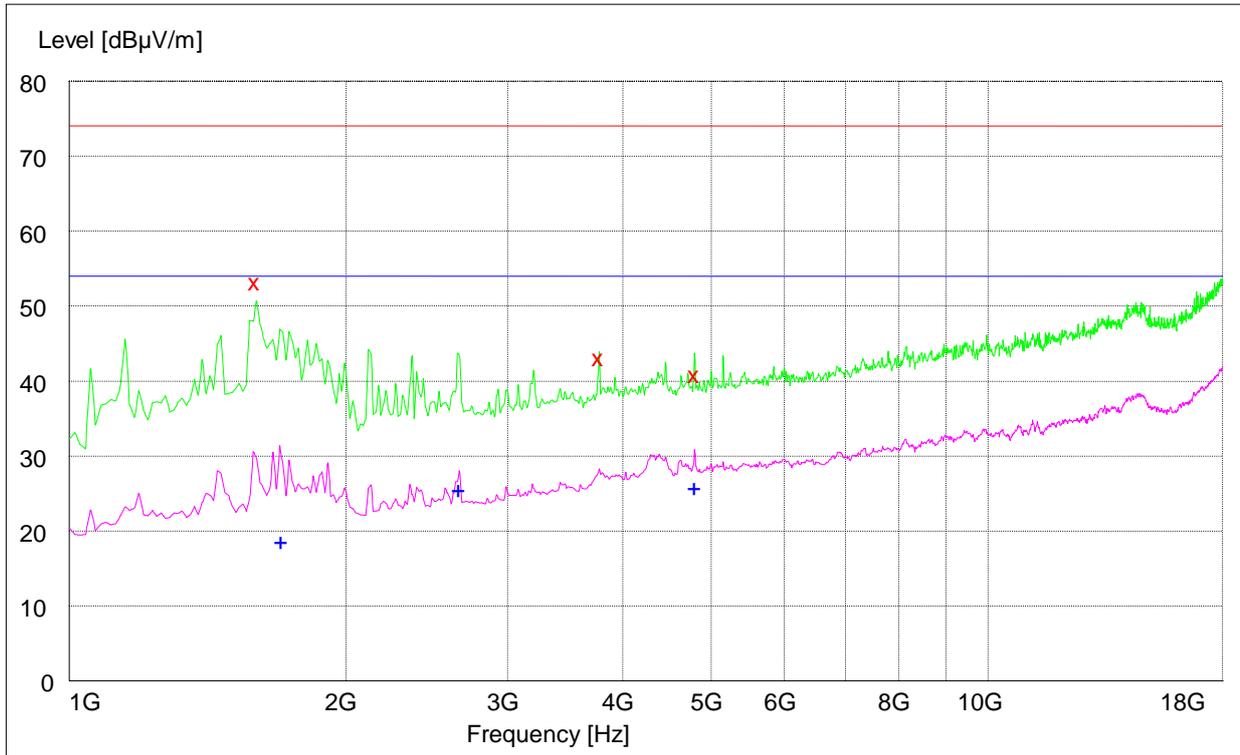
#### 7.1.1 30MHz~1GHz



#### MEASUREMENT RESULT: QP Detector

Frequency	Level	Transducer	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
69.840000	25.60	10.9	40.0	14.4	100.0	126.00	VERTICAL
240.000000	25.50	13.8	46.0	20.5	134.0	115.00	HORIZONTAL
425.040000	29.40	18.1	46.0	16.6	100.0	118.00	HORIZONTAL
480.000000	27.40	18.8	46.0	18.6	100.0	285.00	VERTICAL
720.000000	30.70	22.6	46.0	15.3	119.0	5.00	HORIZONTAL
960.000000	35.40	25.2	46.0	10.6	100.0	112.00	VERTICAL

### 7.1.2 1GHz~18GHz



MEASUREMENT RESULT: PK Detector

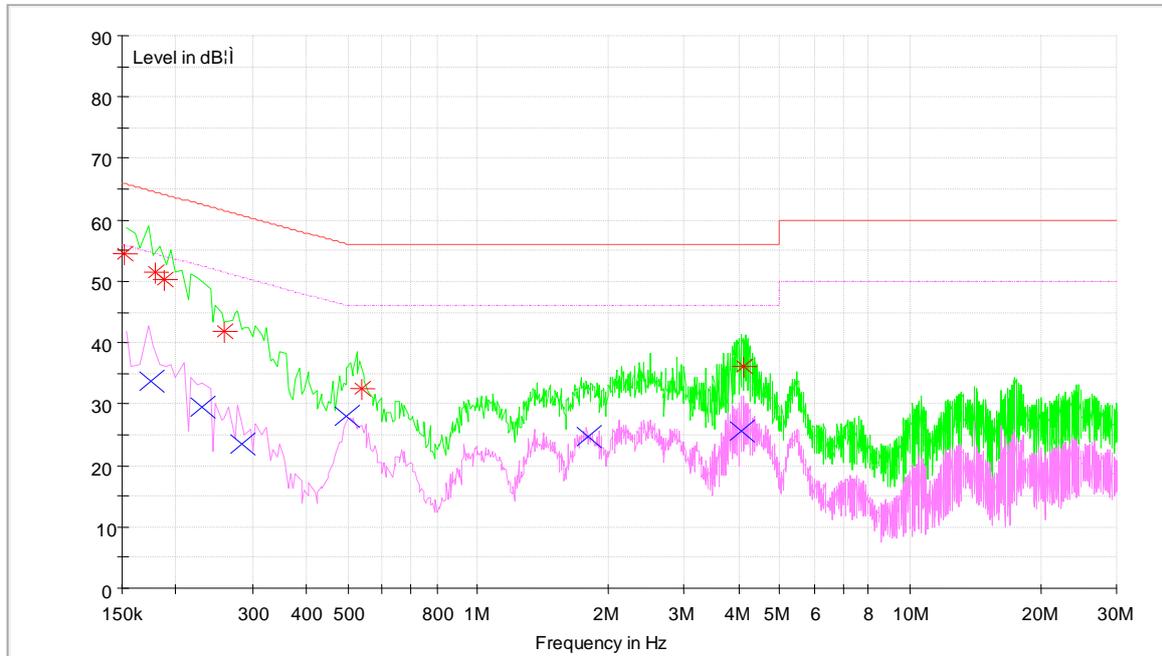
Frequency	Level	Transducer	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
1594.000000	53.40	-14.0	74.0	20.6	100.0	78.00	VERTICAL
3772.500000	43.40	-5.1	74.0	30.6	105.0	149.00	VERTICAL
4789.500000	41.20	-2.7	74.0	32.8	189.0	196.00	VERTICAL

MEASUREMENT RESULT: AV Detector

Frequency	Level	Transducer	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
1701.000000	18.90	-13.3	54.0	35.1	121.0	359.00	VERTICAL
2656.000000	25.90	-9.6	54.0	28.1	102.0	97.00	VERTICAL
4789.500000	26.10	-2.7	54.0	27.9	154.0	203.00	VERTICAL

## 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		
0.151475	54.4	9.7	65.9	11.5	L1	FLO
0.179735	51.3	9.7	64.5	13.2	L1	FLO
0.186709	50.3	9.7	64.2	13.9	N	FLO
0.258724	42.0	9.7	61.5	19.5	N	FLO
0.540562	32.4	9.7	56.0	23.6	L1	FLO
4.134874	36.0	9.8	56.0	20.0	L1	FLO

#### MEASUREMENT RESULT: AV Detector

Frequency	Level	Transducer	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.174978	33.9	9.7	54.7	20.8	L1	FLO
0.228817	29.5	9.7	52.5	23.0	L1	FLO
0.284149	23.3	9.7	50.7	27.4	L1	FLO
0.494647	28.0	9.7	46.1	18.1	N	FLO
1.791401	24.6	9.7	46.0	21.4	L1	FLO
4.048072	25.5	9.8	46.0	20.5	N	FLO

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