



# FCC EMC Test Report

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

**Model Number: E397Bu-501**

**Report No: SYBH(Z-EMC)109112011-2**

**FCC ID: QISE397BU-501**

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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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## 1 General Information

### 1.1 EUT Description

EUT Description	
Product Name	LTE 2D USB Rotator
Model Number	E397Bu-501
Serials Number	E3R01A11A2900012
TX Frequency	GSM850: 824MHz To 849MHz PCS1900: 1850MHz To 1910MHz WCDMA850: 824MHz To 849MHz WCDMA1900: 1850MHz To 1910MHz LTE Band 4: 1710MHz To 1755MHz LTE Band 17: 704MHz To 716MHz
RX Frequency	GSM850: 869MHz To 894MHz PCS1900: 1930MHz To 1990MHz WCDMA850: 869MHz To 894MHz WCDMA1900: 1930MHz To 1990MHz LTE Band 4: 2110MHz To 2155 MHz LTE Band 17: 734MHz To 746MHz
HW Version	CD2E397UM
SW Version	11.433.03.20.000
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
<u>Radiated Emissions</u> Enclosure Port	Mode2 Mode4	CLASS B	Pass	Site1
<u>Conducted Emissions</u> <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.				

### 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 + 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

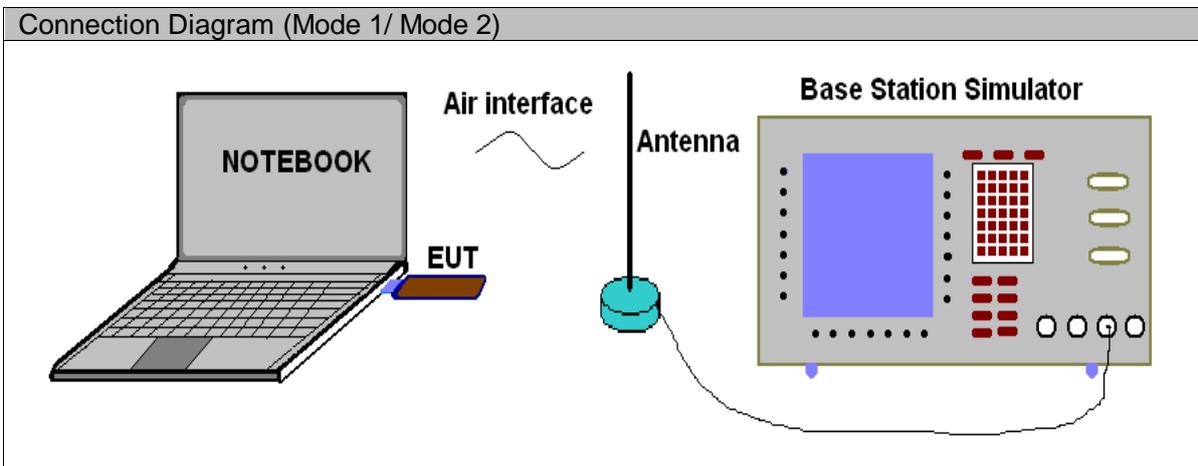
Traffic Mode:

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

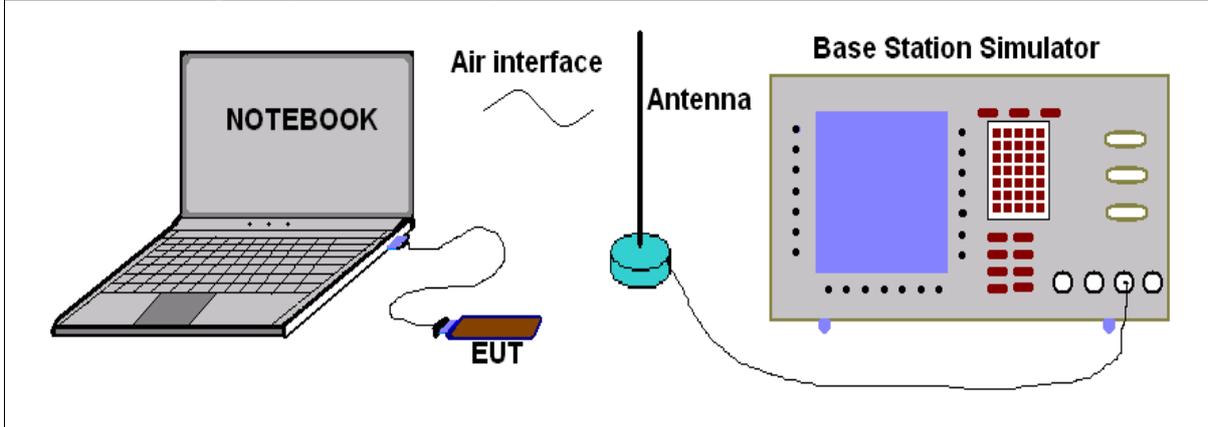
Idle Mode:

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	Cal Date
Radio Communication Tester	CMU200	R&S	3607033573	2011-03-17
Radio Communication Analyzer	MT8820C	ANRITSU	6200930909	2010-12-01
Notebook	T61	ThinkPad	3108052581	NA

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

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 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

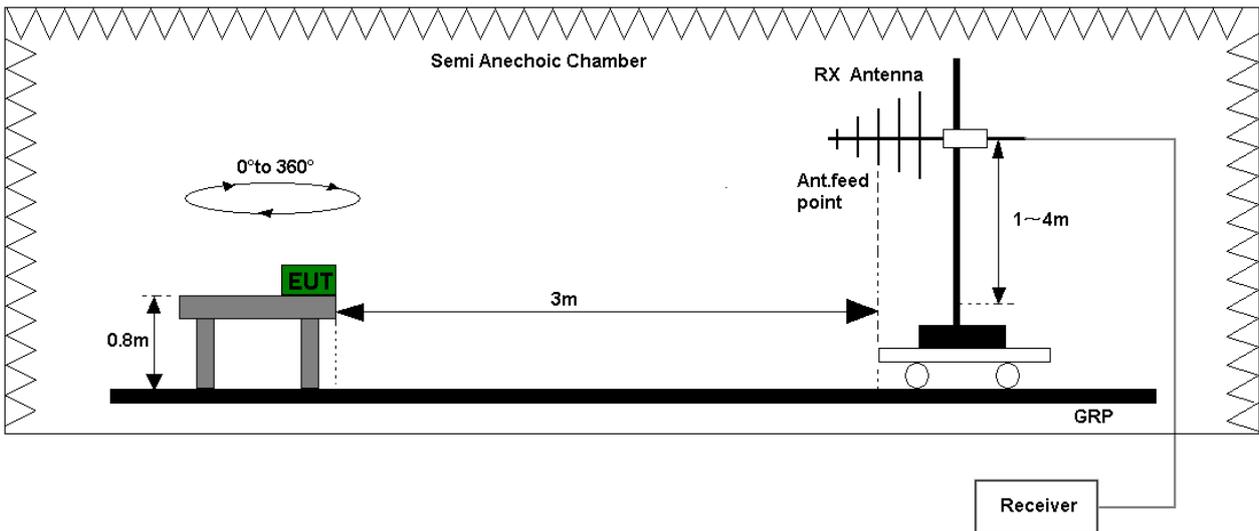


Figure 1. Test set-up of radiated disturbance(30MHz-1GHz )

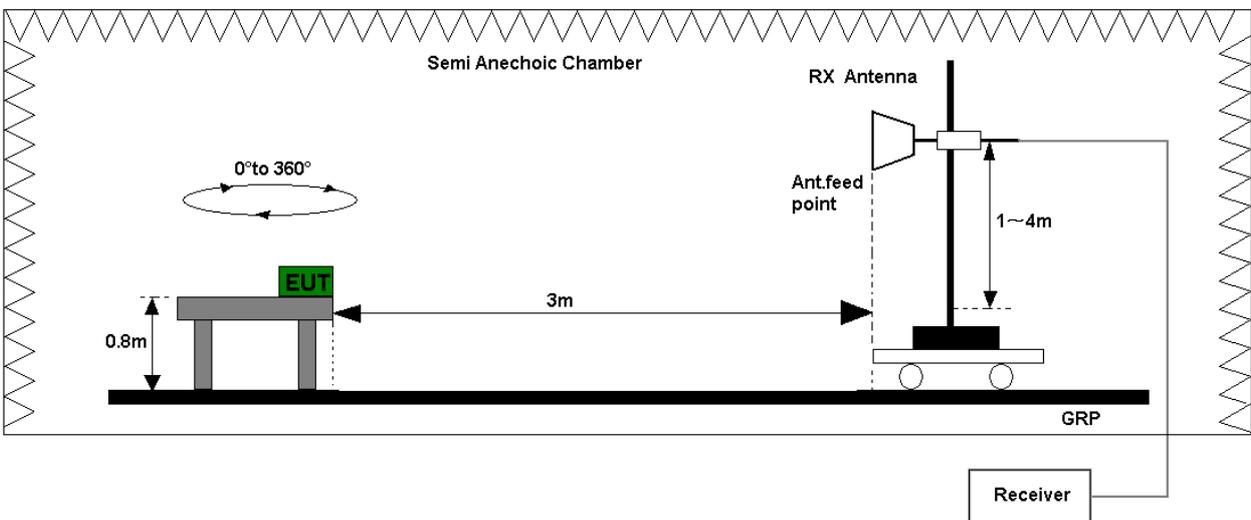


Figure 2. Test set-up of radiated disturbance(above 1GHz)

### 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

Test environment condition:

Performed Item	Item	Required	Actual
Radiated Emission	Ambient temperature	15°C ~ 35°C	22°C
	Relative humidity	25% ~ 75%	55%
	Atmospheric pressure	86 kPa ~ 106kPa	100kPa

## 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 from LISN. The set-up and test methods were according to ANSI C63.4.

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 setup in the screened chamber and operated under nominal conditions.

### 4.2.2 Test Setup

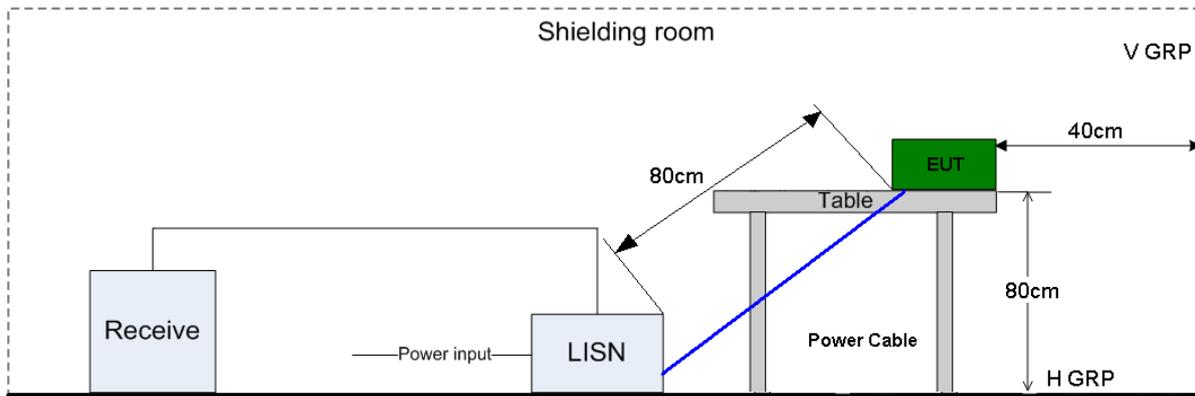


Figure 3. Test Set-up of conducted disturbance

### 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

Test environment condition:

Performed Item	Item	Required	Actual
Conducted Disturbance	Ambient temperature	15°C ~ 35°C	22°C
	Relative humidity	25% ~ 75%	55%
	Atmospheric pressure	86 kPa ~ 106kPa	100kPa

## 5 Main Test Instruments

Main Test Equipments					
Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE/CE	EMI Test receiver	ESU26	R&S	May.30, 2011	12
	Broadband Antenna	VULB 9163	SCHWARZBECK	May.16, 2011	12
	Horn Antenna	HF906	R&S	May.16, 2011	12
	Artificial Mains Network	ENV216	R&S	May.30, 2011	12
Software Information					
Test Item	Software Name	Manufacturer		Version	
RE/CE	ES-K1	R&S		1.7.1	

## 6 System Measurement Uncertainty

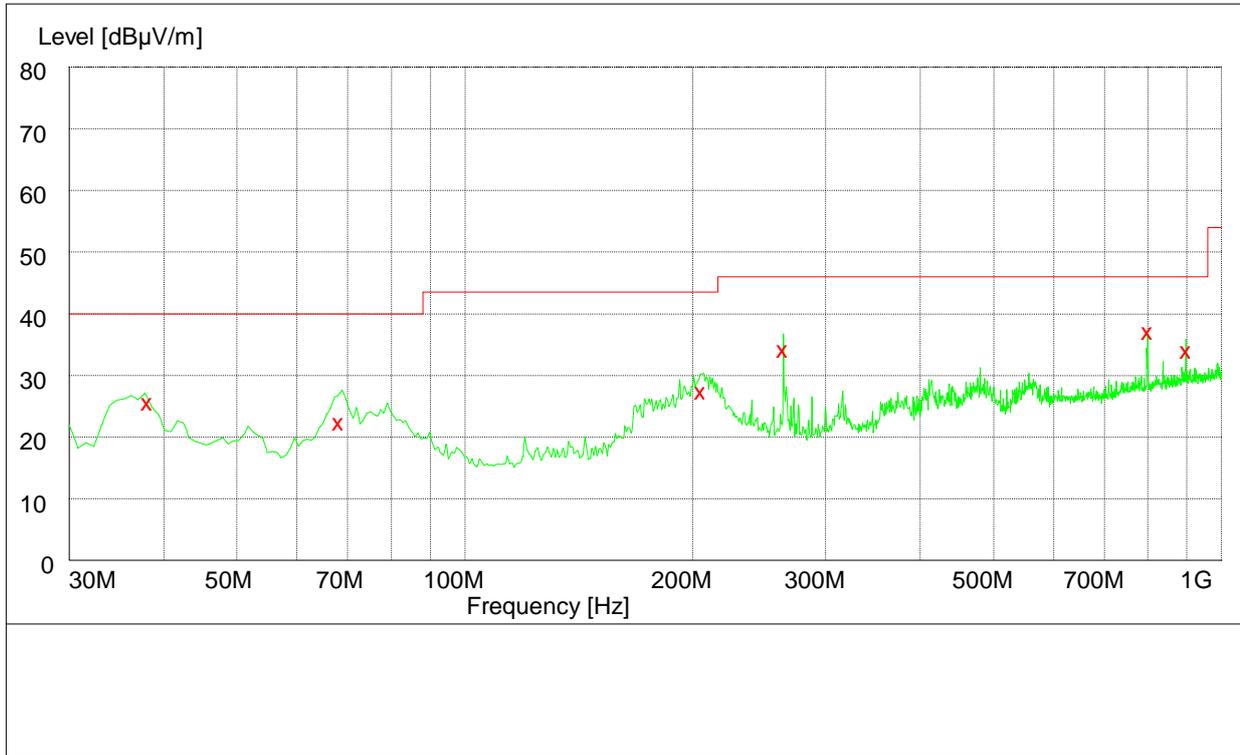
For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

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=4.1dB; k=2
CE	Disturbance Voltage (dB $\mu$ V)	U=3.4dB; k=2

## 7 Graph and Data of Emission Test

### 7.1 Radiated Disturbance

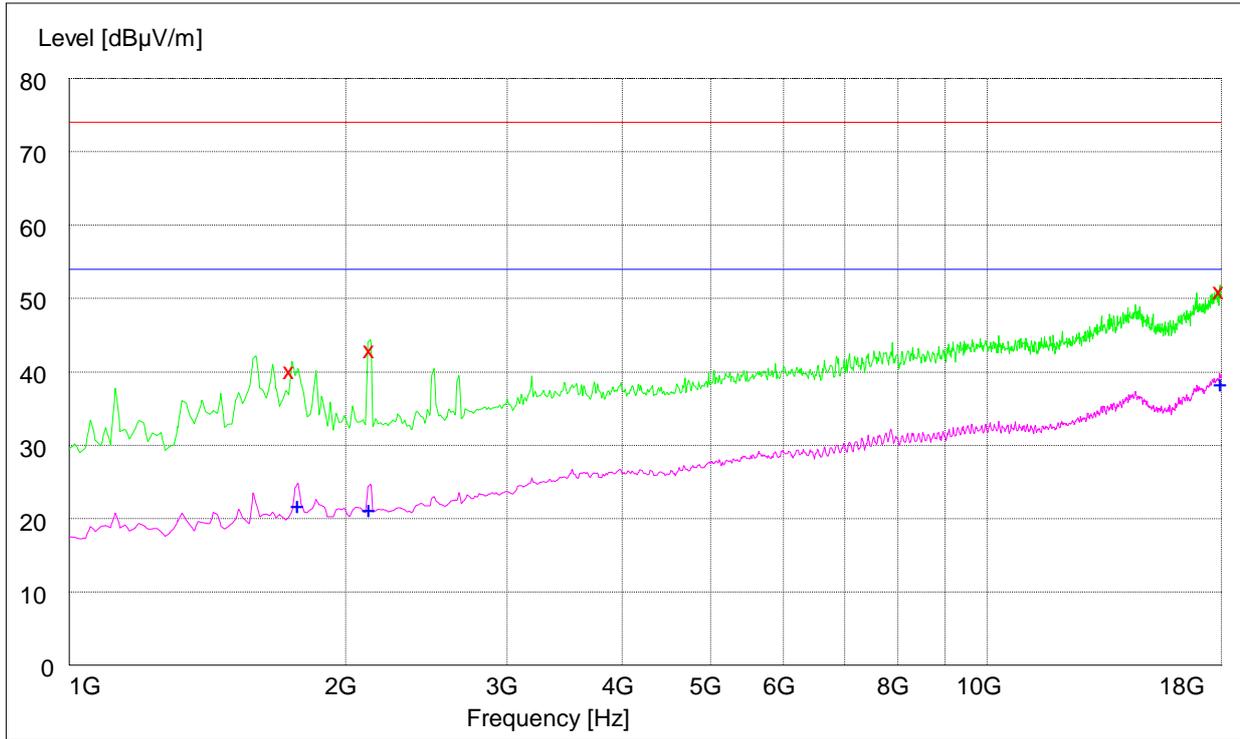
#### 7.1.1 30MHz~1GHz



MEASUREMENT RESULT: QP Detector

Frequency	Level	Transducer	Limit	Margin	Height	Azimuth	Polarisation
MHz	dBµV/m	dB	dBµV/m	dB	cm	deg	
38.100000	26.20	12.6	40.0	13.8	138.0	158.00	VERTICAL
68.160000	23.20	9.1	40.0	16.8	107.0	112.00	VERTICAL
205.500000	28.10	12.3	43.5	15.4	151.0	237.00	HORIZONTAL
264.000000	35.00	14.4	46.0	11.0	100.0	127.00	HORIZONTAL
799.440000	37.90	24.8	46.0	8.1	148.0	110.00	VERTICAL
898.260000	34.00	26.1	46.0	12.0	100.0	339.00	HORIZONTAL

### 7.1.2 1GHz~18GHz



MEASUREMENT RESULT: PK Detector

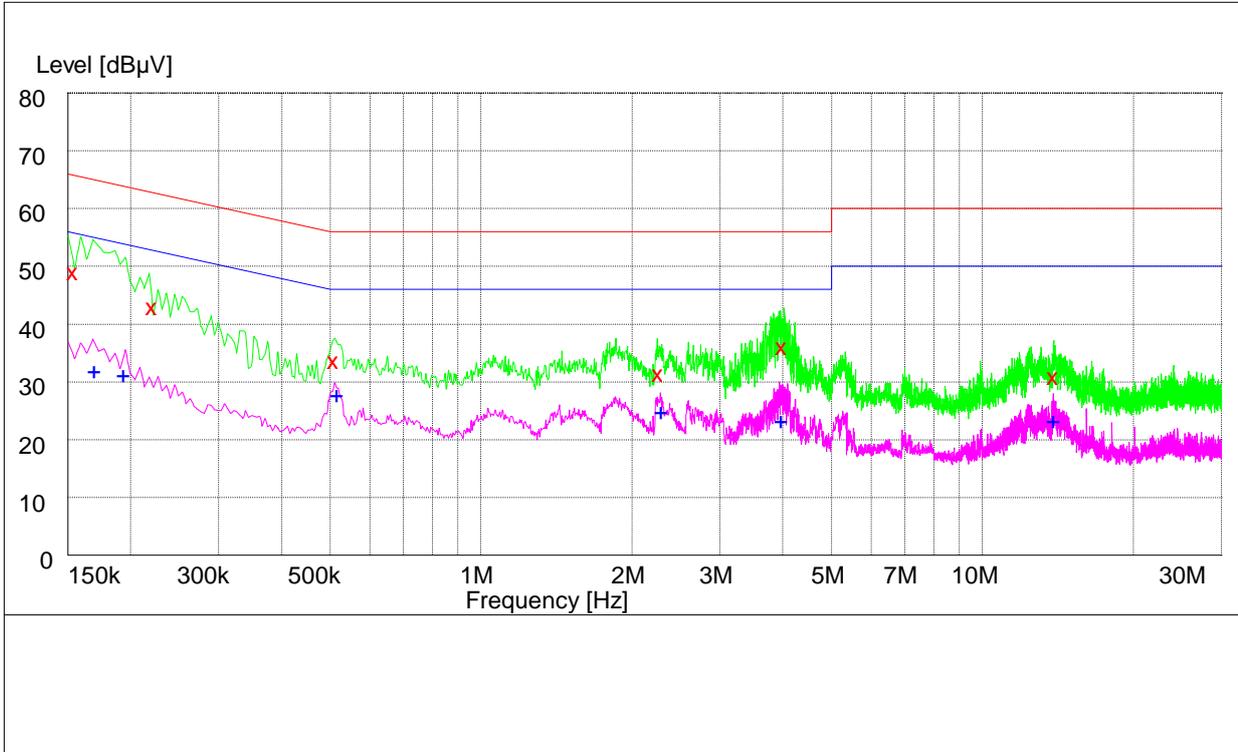
Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1740.500000	40.00	-13.1	74.0	34.0	104.0	91.00	VERTICAL
2125.500000	43.30	-11.3	74.0	30.7	128.0	68.00	VERTICAL
17914.500000	51.40	19.2	74.0	22.6	140.0	159.00	VERTICAL

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
1776.000000	22.10	-12.8	54.0	31.9	100.0	90.00	VERTICAL
2122.500000	21.60	-11.3	54.0	32.4	130.0	69.00	VERTICAL
17932.500000	38.70	19.3	54.0	15.3	200.0	194.00	VERTICAL

## 7.2 Conducted Disturbance

### 7.2.1 AC Port Test Data



#### MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.154000	49.90	10.1	66	16.1	N	FLO
0.222000	43.90	10.0	63	19.1	L1	FLO
0.510000	34.50	10.1	56	21.5	L1	FLO
2.260000	32.30	10.1	56	23.7	N	FLO
3.998000	37.00	10.2	56	19	L1	FLO
13.878000	31.20	10.3	60	28.8	L1	FLO

#### MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.170000	32.90	10.1	55	22.1	N	FLO
0.194000	32.10	10.1	54	21.9	N	FLO
0.518000	28.70	10.1	46	17.3	N	FLO
2.296000	25.70	10.1	46	20.3	L1	FLO
3.964000	24.20	10.2	46	21.8	L1	FLO
13.862000	24.30	10.3	50	25.7	L1	FLO

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