



Report on EMC Test of WCDMA/GPRS/GSM/EDGE MOBILE PHONE With Bluetooth M/N: U5705

Report No: SYBH (R)181082007EB-4



Reliability Laboratory of Huawei Technologies Co., Ltd.

Address: Huawei Technologies Co., Ltd. Bantian Longgang District Shenzhen, P.R. China

Post Code: 518129 Tel: +86 755 89651014 Fax: +86 755 89652518

Notice 1

1. The laboratory has obtained the accreditation of China National Accreditation Committee for Laboratories (CNAL), and accreditation number: L0310.
2. The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01.
3. 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.
4. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
5. The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is R2364, C2583, and T256.
6. The test report is invalid if not marked with "exclusive stamp for the test report".
7. Any copy of the test report is invalid if not re-marked with the "exclusive stamp for the test report".
8. The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
9. The test report is invalid if there is any evidence of erasure and/or falsification.
10. 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.
11. Normally, the test report is only responsible for the samples that have undergone the test.
12. 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.

Notice 2

Modification Information:

Table 1 Modification Information

Modification Information	1	
	2	
	3	<i>Not Applicable!</i>
	4	
	5	
	6	
	7	



REPORT ON **EMC Test of WCDMA/GPRS/GSM/EDGE MOBILE PHONE With Bluetooth**
M/N: U5705

REGULATION **FCC CFR47 Part 15: Subpart B;**

START OF TEST **Sep.10, 2007**

END OF TEST **sep.20, 2007**

Final Judgement: **Pass**

Approver

2007-09-21
Date

张兴海
Name

张兴海
Signature



Reviewer

2007-09-21
Date

余辉
Name

余辉
Signature

Operator

2007-09-21
Date

张飞
Name

张飞
Signature

REPORT BODY CONTENT

1	Status.....	6
1.1	Product Information.....	6
1.2	Applied Standard.....	6
1.3	Test Site.....	7
1.4	Test environment condition.....	7
2	Summary of Results.....	8
3	Equipment Specification.....	9
3.1	General Description.....	9
3.2	Technical Data.....	9
3.3	Sub-Assembly Identity.....	10
4	System Configuration during EMC Test.....	11
4.1	Cables Used during Test.....	11
4.2	Associated Equipment Used during Test.....	11
4.3	Test Configurations and Test Mode.....	11
4.4	Test conditions and test connections.....	11
5	Electromagnetic Interference (EMI).....	14
5.1	Radiated Disturbance 30MHz to 1000MHz.....	14
5.2	Conducted Disturbance 0.15 MHz to 30MHz.....	15
5.3	Radiated Spurious Emissions.....	16
6	Main Test Instruments.....	18
7	System Measurement Uncertainty.....	19
8	Graph and Data of Emission Test.....	20
8.1	Radiated Disturbance.....	20
8.2	Conducted Disturbance.....	21
8.3	Radiated Spurious Emission.....	22
9	Photographs of Test Set-ups.....	34
9.1	Radiated Emissions.....	34
9.2	Conducted Emissions.....	37

1 Status

1.1 Product Information

CLIENT: Huawei Technologies Co., Ltd.
ADDRESS: Bantian Longgang District Shenzhen, P.R. China
MANUFACTURING DESCRIPTION HUAWEI WCDMA/GPRS/GSM/EDGE MOBILE
PHONE With Bluetooth
MANUFACTURERS MODEL NUMBER U5705

1.2 Applied Standard

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
-	15.107	Conducted Emission at Power Port	PASS
-	15.109	Radiated Emission of Enclosure in Idle Mode	PASS
2.1051	22.917	Spurious Emission at Antenna Terminals	PASS



1.3 Test Site

Site 1:

EMC LABORATORY OF RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

1.4 Test environment condition

Ambient temperature	20~25°C
Relative humidity	40%~52%
Atmospheric pressure	101kPa

2 Summary of Results

Table 2 below shows a brief summary of the results obtained.

Table 2 Summary of results

EUT Classification : Wireless Terminal				
Test Items	Test Configuration & Test Mode	Required Performance Criteria	Result	Site
<u>Radiated Emissions</u> Enclosure Port	TC1 (TM1~TM12)	N/A	Pass	Site1
<u>Conducted Emissions</u>	TC1 (TM1~TM12)	N/A	Pass	Site1
<u>Radiated Spurious Emissions</u> Enclosure Port 30MHz – 12.75GHz	TC1 (TM1~TM6)	N/A	Pass	Site1

Note:

- 1, Measurement taken is within the measurement uncertainty of measurement system.
- 2, TC = Test configuration
- 3, NT=no test. Because of not containing devices susceptible to magnetic fields, the EUT has been exempt from immunity test of power frequency magnetic field.

3 Equipment Specification

3.1 General Description

HUAWEI WCDMA/GPRS/GSM/EDGE MOBILE PHONE With Bluetooth – U5705 is subscriber equipment in the WCDMA/GSM system. The WCDMA frequency band is Band II and Band V. The GSM frequency band includes GSM850 and DCS1800 and PCS1900. U5705 implements such functions as RF signal receiving/sending, WCDMA and GSM/GPRS/EGPRS protocol processing, voice and data service etc. Externally it provides Micro SD card interface, earphone port(to provide voice service) and USIM card interface.

3.2 Technical Data

3.2.1 Main Equipment Technical Data

Description:	:	WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth
Models:	:	U5705
Input Rated Voltage	:	⎓ 3.7V
Extreme Voltage	:	⎓ 3.6V and ⎓ 4.2V
Rated Power	:	Normal 3W ,Max 8 W
Dimensions	:	97.5 (depth) ×46 (width) ×16.8 (height) (mm3)
Weight	:	<110g
S/N	:	UB1AC10762200021

	Mode	Work Frequency	
		Transmitt Frequency (MHz)	Receive Frequency (MHz)
GSM	GSM850	824-849	869-894
	PCS1900	1850-1910	1930-1990
WCDMA	Band II	824-849	869-894
	Band V	1850-1910	1930-1990



Figure 1. EUT Appearance

3.3 Sub-Assembly Identity

Table 3 Sub-Assembly Identity

Board				
Model Name	Qty.	Hardware Version	Serial	Description
HD1U720H	1	VER.C	U720H-12	Main board of Mobile Phone
Accessory				
Name	Qty.	Manufacture	Serials number	Description
Adapter	1	TECH-POWER INTERNATIONAL CO.,LTD	TP1732800988	voltage nominal: ~120V Input voltage: ~100-240V ;50/60Hz Output voltage: --- +5.0V , 0.65A Rate power: 4W
Rechargeable Li-ion	1	FMT Electronics Co.,Ltd.	FMT772111677L	Battery Model: HBU570 Rated capacity: 900mAh Nominal Voltage: --- +3.7V Charging Voltage: --- +4.2V

4 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The EUT was installed within the test site and was configured to simulate a typical user installation.

4.1 Cables Used during Test

Table 4 Cable Used during Test

Port	Length	Quantity	Type of Cable
AC Power Port	3m	1	Unshielded
USB	0.85m	1	shielded
Earphone	1.25m	1	Unshielded

4.2 Associated Equipment Used during Test

Table 5 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date	Cal Interval (month)
Radio Communication Tester	CMU200	R&S	108522	2007.03.22	12

4.3 Test Configurations and Test Mode

4.3.1 Test Configuration.

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

Table 6 Configuration table

TC1	TM1~TM12
-----	----------

4.3.2 Test Mode

There were twelve test Modes. TM1 and TM12 were shown in the diagrams below:

- TM1: operate in traffic GSM 850;
- TM2: operate in traffic mode EGPRS 850;
- TM3: operate in traffic mode GSM 1900;
- TM4: operate in traffic mode EGPRS 1900;
- TM5: operate in traffic mode WCDMA for band II;
- TM6: operate in traffic mode WCDMA for band V;
- TM7: operate in idle GSM 850;
- TM8: operate in idle mode EGPRS 850;
- TM9: operate in idle mode GSM 1900;
- TM10: operate in idle mode EGPRS 1900;
- TM11: operate in idle mode WCDMA for band II;
- TM12: operate in idle mode WCDMA for band V;

The U5705 will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

4.4 Test conditions and test connections

4.4.1 Test Conditions

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

4.4.2 Test connections

Traffic Mode:

The EUT is required to be in the traffic mode, a call is set up according to the generic call set up procedure and enter the EUT into loop back test mode.(WCDMA see 3GPP TS 34.121,GSM see ETSI TS 151.010).

For WCDMA, the following conditions shall also be met:

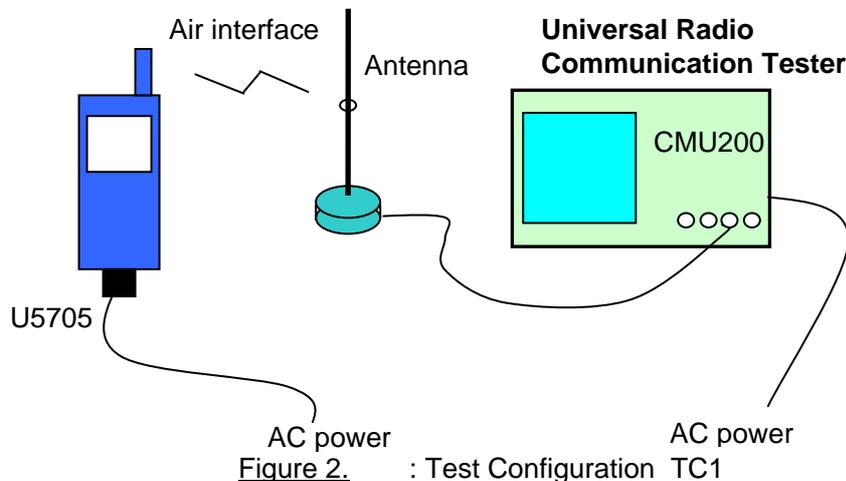
Logical Test Interface for details regarding generic call set-up procedure and BER, BLER test loop scenarios:

- set and send continuously up power control commands to the UE;
- The DTX shall be disabled;
- Inner Loop Power Control shall be enabled;
- transmitting and/or receiving (UL/DL) bit rate for reference test channel shall be 12.2 kbit / s.
- The EUT shall be commanded to operate at maximum transmit power;

For Cellular and PCS, the following conditions shall also be met:

- The EUT shall be commanded to operate at maximum transmit power;
- The downlink RXQUAL shall be monitored.

Assign channel frequency to an appropriate channel number. Set the ARFCN channel number to 192 for GSM850, to 4182 for WCDMA 850, to 661 for PCS1900, and to 9400 for WCDMA1900.



Idle Mode:

The EUT will be connected to test system (Base Station Simulator) in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment).

The EUT is required to be in the idle mode.

For WCDMA, the following conditions shall be met:

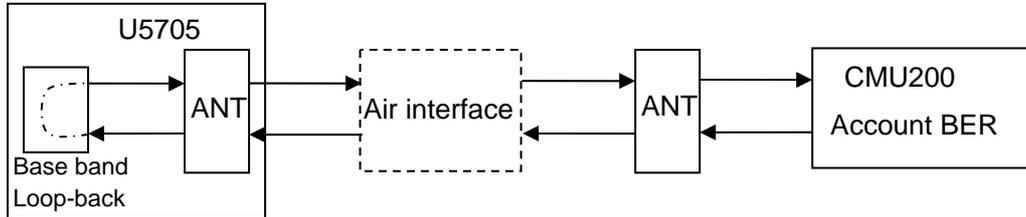
- UE shall be camped on a cell;
- UE shall perform Location Registration (LR) before the test, but not during the test;
- UE's neighbour cell list shall be empty;
- Paging repetition period and DRX cycle shall be set to minimum (shortest possible time interval).

For Cellular and PCS, the following conditions shall be met:

When the EUT is required to be in the idle mode, the test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. The EUT

shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages. Periodic Location Updating shall be disabled.

Please refer to following figure:



ANT: Antenna
BER: Bit Error Rate

Figure 3. Test Configuration TC1

5 Electromagnetic Interference (EMI)

5.1 Radiated Disturbance 30MHz to 1000MHz

5.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2003). The test distance was 3m. The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4. The Radiated Disturbance measurements were made using a Rohde and Schwarz ESMI Test Receiver and control software ES-K1.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 1GHz by using test script of software; the emissions were measured using a Quasi-Peak Detector. 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.

Huawei Mobile Station was communicated with the BTS simulator through Air interface. The Mobile Station operated on the typical channel and the Mobile Station worked in idle mode, transmitter was not work in this test.

EUT was configured to idle mode according to TC1 and the test performed at worst emission state.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 k Hz

Test set up figure:

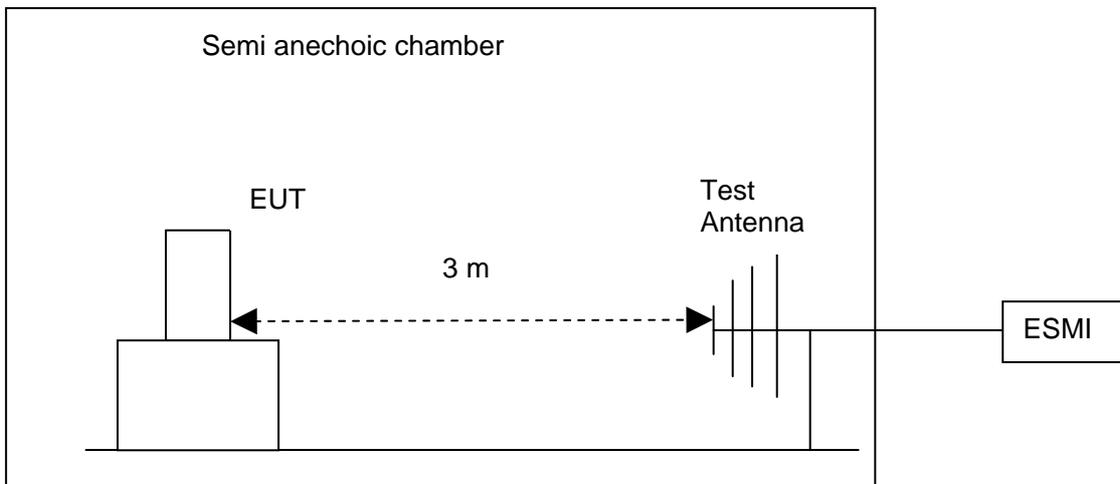


Figure 4. Test set up

5.1.2 Test Results

The EUT has met the requirements for Radiated Emission of enclosure port. The test data is shown in section 8.1 of the report.

Table 7 Test Limits

Frequency of Emission (MHz)	Radiated Limit	
	Unit($\mu\text{V}/\text{m}$)	Unit($\text{dB}\mu\text{V}/\text{m}$)
30-88	100	40
88-216	150	43.5
216-960	200	46
960-1000	500	54

5.2 Conducted Disturbance 0.15 MHz to 30MHz

5.2.1 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: 2003.

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.

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

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

Test Set-up figure:

The Mobile Station was setup in the screened chamber and operated under nominal conditions.

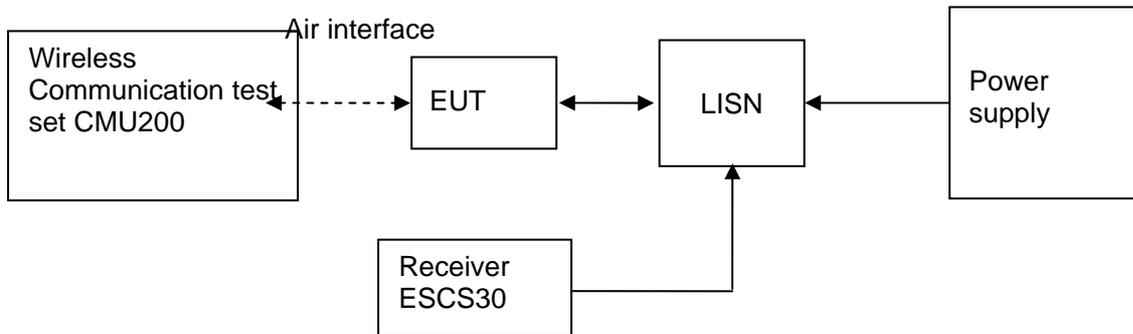


Figure 5. Test Set-up

5.2.2 Test Results

The EUT has met requirements for Conducted disturbance of signal lines. The test data is shown in section 8.2 of the report.

Table 8 Test Limit of DC&AC Power Port

Frequency range	150kHz~ 30MHz	
Classification	Class B	
Limit(Class B)	Voltage limits	
	QP	AV
0.15MHz~0.5MHz	66~56 dB μ V	56~46 dB μ V
0.5MHz~5MHz	56 dB μ V	46 dB μ V
5MHz~30MHz	60 dB μ V	50 dB μ V

6 Main Test Instruments

Table 10 Main Test Equipments

Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESMI	R&S	April.23, 2007	12
	Broadband Antenna	CBL 6112B (2941)	SCHAFFNER	Feb.26, 2007	12
CE	EMI Test receiver	ESCS30	R&S	May.29, 2007	12
	Artificial Mains Network	ENV4200	R&S	May.21, 2007	12
RSE	EMI Test receiver	ESIB26	R&S	May.30.2007	12
	Horn Antenna	3117	EMCO	May.20.2007	12
	Broadband Antenna	CBL6112B /2941	SCHAFFNER	Feb.16.2007	12
	Horn Antenna	3160	EMCO	May.20.2007	12
Software Information					
Test Item	Software Name	Manufacturer	Version		
RE/CE	ES-K1	R&S	1.7.1		
RSE	EMC32	R&S	V5.0		

7 System Measurement Uncertainty

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

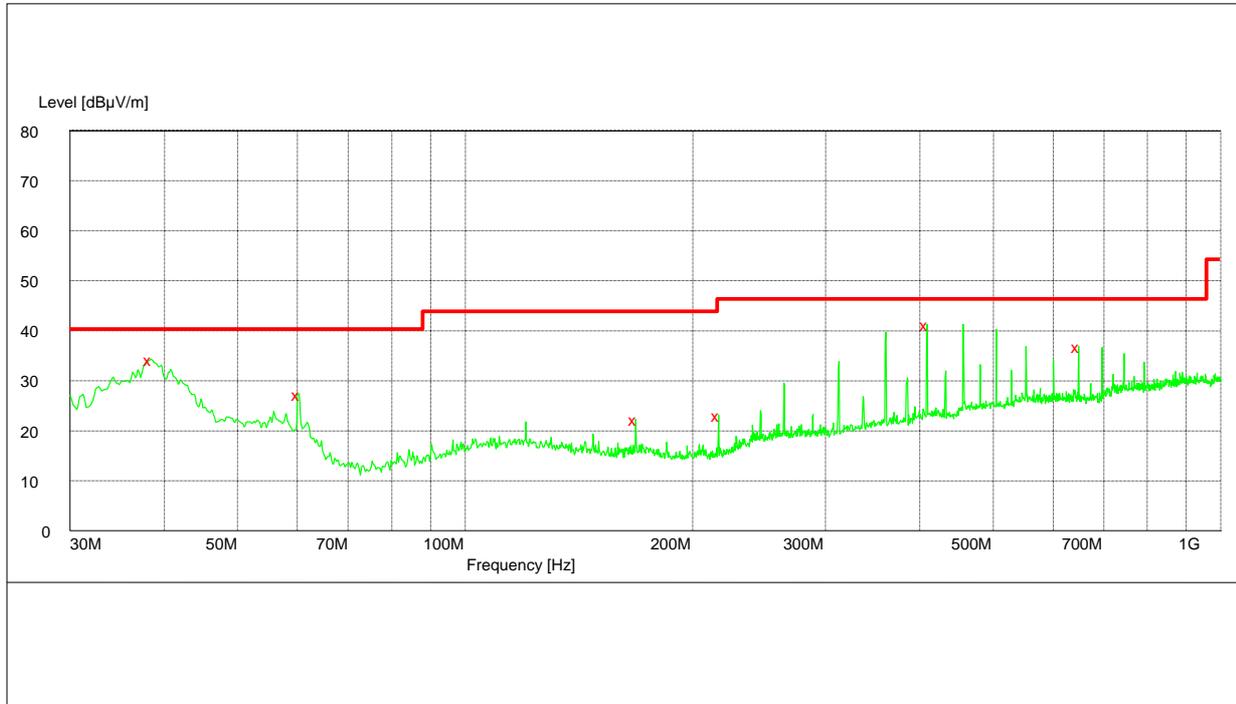
Table 11 System Measurement Uncertainty

	Items	Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.6dB; k=2(30MHz-1GHz)
RSE	ERP (dBm)	U = 2.2dB ; k = 2
CE	Disturbance Voltage (dB μ V)	U=3.3dB; k=2

8 Graph and Data of Emission Test

8.1 Radiated Disturbance

8.1.1 Radiated Disturbance of TC1

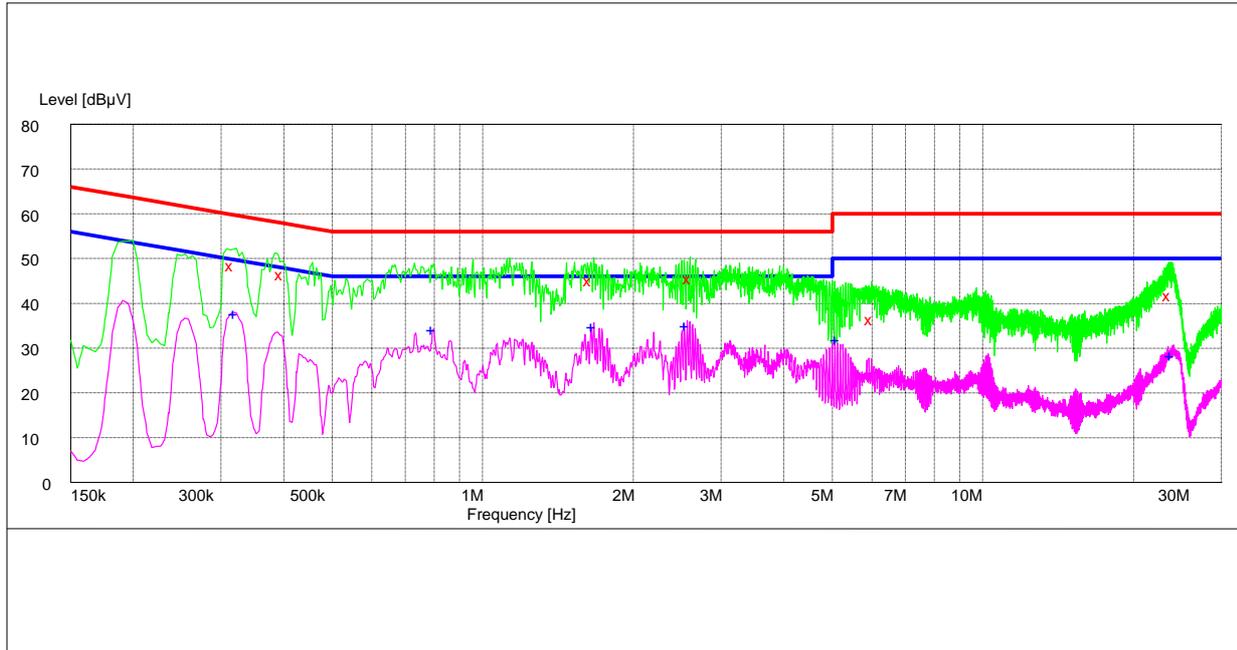


MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
38.400000	34.30	-8.7	40.0	5.7	100.0	0.00	VERTICAL
60.300000	27.30	-16.4	40.0	12.7	104.0	220.00	VERTICAL
168.300000	22.30	-11.8	43.5	21.2	198.0	0.00	HORIZONTAL
216.600000	23.10	-11.5	46.0	22.9	110.0	100.00	HORIZONTAL
408.888889	41.30	-3.9	46.0	4.7	100.0	92.00	HORIZONTAL
648.444444	36.90	-1.6	46.0	9.1	100.0	94.00	HORIZONTAL

8.2 Conducted Disturbance

8.2.1 AC Power Port Test Data



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.316500	48.80	10.2	60	11.0	QP	L3	FLO
0.397500	46.80	10.1	58	11.1	QP	L3	FLO
1.644000	45.30	9.9	56	10.7	QP	L3	FLO
2.598000	45.80	10.1	56	10.2	QP	L3	FLO
6.013500	36.70	10.3	60	23.3	QP	L3	FLO
23.658000	42.00	15.3	60	18.0	QP	N	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.321000	38.10	10.2	50	11.6	AV	L3	FLO
0.798000	34.60	9.9	46	11.4	AV	L3	FLO
1.666500	35.30	9.9	46	10.7	AV	L3	FLO
2.566500	35.40	10.1	46	10.6	AV	L3	FLO
5.131500	32.30	10.1	50	17.7	AV	L3	FLO
23.941500	28.80	15.2	50	21.2	AV	N	FLO