

Huawei Technologies Co.,Ltd

Application
For
Certification

FCC ID: QISHG531V1

300Mbps Wireless ADSL2+Router

Model: HG531 V1

Class B Personal Computer Peripherals

Report No.: 130926010SZN-002

Prepared and Checked by:

Approved by:

Sign on file

Lin Lin
Project Engineer

Billy Li
Supervisor
Date: 25 October, 2013

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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TRF No.: FCC 15C_PC_b

Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch

6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751 Website: www.china.intertek-etlsemko.com

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LIST OF EXHIBITS

INTRODUCTION

<i>EXHIBIT 1:</i>	General Description
<i>EXHIBIT 2:</i>	System Test Configuration
<i>EXHIBIT 3:</i>	Emission Results
<i>EXHIBIT 4:</i>	Equipment Photographs
<i>EXHIBIT 5:</i>	Product Labeling
<i>EXHIBIT 6:</i>	Technical Specifications
<i>EXHIBIT 7:</i>	Instruction Manual
<i>EXHIBIT 8:</i>	Miscellaneous Information
<i>EXHIBIT 9:</i>	Confidentiality Request
<i>EXHIBIT 10:</i>	Test Equipment List

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MEASUREMENT / TECHNICAL REPORT

Huawei Technologies Co.,Ltd

MODEL: HG531 V1

FCC ID: QISHG531V1

This report concerns (check one): Original Grant Class II Change

Equipment Type: JBP-Part 15 Class B Computing Device/Peripherals

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes No

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes No

If no, assumed Part 15, Subpart B for unintentional radiator – the new 47 CFR [10-01-12 Edition] provision.

Report prepared by:

Billy Li
Intertek Test Services Shenzhen Ltd.
Kejiyuan Branch
6F, D Block, Huahan Building, Langshan Road
Nanshan District, Shenzhen, P. R. China
Phone: (86 755) 8614 0645
Fax: (86 755) 8614 6751

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Table of Contents

1.0	<u>General Description</u>	2
1.1	Product Description.....	2
1.2	Related Submittal(s) Grants.....	2
1.3	Test Methodology.....	2
1.4	Test Facility.....	2
2.0	<u>System Test Configuration</u>	4
2.1	Justification.....	4
2.2	EUT Exercising Software.....	4
2.3	Special Accessories.....	4
2.4	Equipment Modification.....	4
2.5	Measurement Uncertainty.....	5
2.6	Support Equipment List and Description.....	5
3.0	<u>Emission Results</u>	7
3.1	Field Strength Calculation.....	8
3.2	Radiated Emission Configuration Photograph.....	9
3.3	Radiated Emission Data.....	9
3.4	Conducted Emission Configuration Photograph.....	11
3.5	Conducted Emission Data.....	11
4.0	<u>Equipment Photographs</u>	15
5.0	<u>Product Labelling</u>	17
6.0	<u>Technical Specifications</u>	19
7.0	<u>Instruction Manual</u>	21
8.0	<u>Miscellaneous Information</u>	23
8.1	Emissions Test Procedures.....	23
9.0	<u>Confidentiality Request</u>	26
10.0	<u>Test Equipment List</u>	28

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List of attached file

Exhibit type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Setup Photo	Conducted Emission	conducted photos.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidentiality Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf

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EXHIBIT 1

GENERAL DESCRIPTION

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1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a 300Mbps Wireless ADSL2+Router, It is powered by AC/DC Adapter. The personal computers can through this router to connect with internet for personal use. For more detailed features description, please refer to the user's manual.

1.2 Related Submittal(s) Grants

This is an application for certification of a computer peripherals.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are **Intertek Test Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

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EXHIBIT 2

SYSTEM TEST CONFIGURATION

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2.0 **System Test Configuration**

2.1 Justification

The system was configured for Test in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The device was powered by AC Adapter through 120V/60Hz during the test. The worst case data was reported in this report.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. The step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for Test in a typical fashion (as a customer would normally use it). The EUT was placed on turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

The frequency range from 30MHz to 2GHz (EUT highest frequency is 460MHz, so according to 15.33, the test range is update to 2GHz) was searched for spurious emissions from the device. Only those emissions reported were detected. All other emissions were at least 20 dB below the applicable limits.

2.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted Test was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified Test.

2.3 Special Accessories

N/A

2.4 Equipment Modification

Any modifications installed previous to Test by Huawei Technologies Co.,Ltd Will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Test Services Shenzhen Ltd.

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Kejiyuan Branch.

2.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

Description	Manufacturer	Model No.
Laptop	Lenovo	T420
Hard Disk	Smart.drive	HD-003
USB Cable	Smart.drive	Unshielded, Length 155cm
1394 Cable	Smart.drive	Unshielded, Length 180cm
RJ45 Cable*5	N/A	Unshielded, Length: 200cm
RJ11 Cable*1	N/A	Unshielded, Length: 600cm
DSL simulator	Huawei	02GN
AC Adapter	Huawei	HW-120050E1W Input:100-240V 50/60Hz; Output: 12Vdc, 0.5A
Router*4	TP-LINK	TL-MR11U

Note: this production has two AC/DC Adapter suppliers, and had been arranged testing separately, the worst-case was recorded in this report.

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EXHIBIT 3

EMISSION RESULTS

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3.0 Emission Results

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Example

Assume a receiver reading of 62.0dB μ V is obtained. The antenna factor of 7.4dB and cable factor of 1.6dB is added. The amplifier gain of 29dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0dB, and the resultant average factor was -10dB. The net field strength for comparison to the appropriate emission limit is 32dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0\text{dB}\mu\text{V}$$

$$AF = 7.4\text{dB}$$

$$CF = 1.6\text{dB}$$

$$AG = 29.0\text{dB}$$

$$PD = 0\text{dB}$$

$$AV = -10\text{dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32\text{dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8\mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
At
150.006MHz (Data transfer Mode)

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 1.3dB margin (Data transfer Mode)

TEST PERSONNEL:

Sign on file

Lin Lin Project Engineer
Typed/Printed Name

October 18, 2013
Date

INTERTEK TESTING SERVICES

Applicant: Huawei Technologies Co.,Ltd

Model: HG531 V1

Worst case operating Mode: Data transfer (AC/DC Adapter: Huntkey)

Radiated Emissions (30MHz~2GHz)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	149.795	46.8	20.0	8.0	34.8	43.5	-8.7
Horizontal	499.989	37.9	20.0	18.3	36.2	46.0	-9.8
Horizontal	750.225	31.8	20.0	22.1	33.9	46.0	-12.1
Vertical	75.004	48.0	20.0	7.6	35.6	40.0	-4.4
Vertical	150.006	54.2	20.0	8.0	42.2	43.5	-1.3
Vertical	499.999	42.9	20.0	18.3	41.2	46.0	-4.8
Vertical	1830.495	34.4	20.0	29.9	44.3	54.0	-9.7

NOTES:

1. Quasi-Peak detector is used for frequency up to 1GHz and PEAK detector is used for frequency from 1-2GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3 meter distances were measured at 0.3- meter and an inverse proportional extrapolation was performed to compare the signal level to the 3 meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions up to 1GHz are below the QP limit and all emissions between 1-2GHz are below the AV limit.

TRF No.: FCC 15C_PC_b

FCC ID: QISHG531V1

Report No.: 130926010SZN-002

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3.4 Conducted Emission Configuration Photograph

Worst Case Live-Conducted Configuration
at
0.430 MHz (Data transfer Mode)

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

3.5 Conducted Emission Data

Judgement: Passed by 5.9 dB margin (Data transfer Mode)

TEST PERSONNEL:

Sign on file

Lin Lin Project Engineer
Typed/Printed Name

October 18, 2013
Date

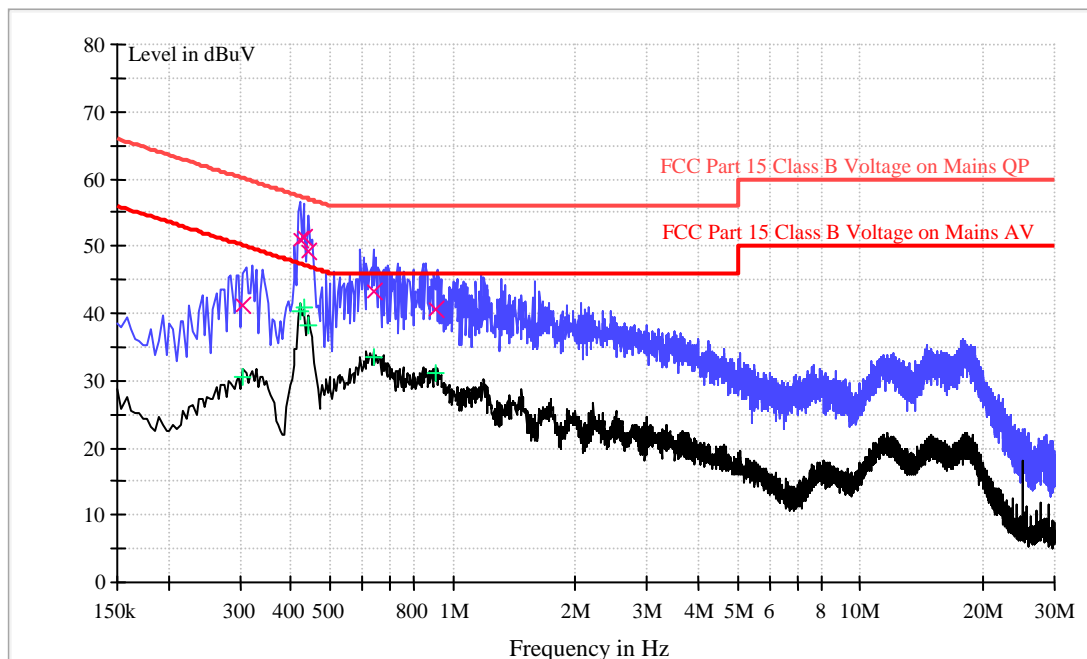
INTERTEK TESTING SERVICES

Applicant: Huawei Technologies Co.,Ltd

Model: HG531 V1

Worst case operating Mode: Data transfer (AC/DC Adapter: Huntkey)

Conducted Emission Test – FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.306	41.1	L1	9.7	19.0	60.1
0.422	51.1	L1	9.7	6.3	57.4
0.430	51.4	L1	9.7	5.9	57.3
0.442	49.3	L1	9.7	7.7	57.0
0.638	43.1	L1	9.7	12.9	56.0
0.910	40.6	L1	9.7	15.4	56.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.306	30.5	L1	9.7	19.6	50.1
0.422	40.3	L1	9.7	7.1	47.4
0.430	40.8	L1	9.7	6.5	47.3
0.442	38.3	L1	9.7	8.7	47.0
0.638	33.4	L1	9.7	12.6	46.0
0.910	31.2	L1	9.7	14.8	46.0

TRF No.: FCC 15C_PC_b

FCC ID: QISHG531V1

Report No.: 130926010SZN-002

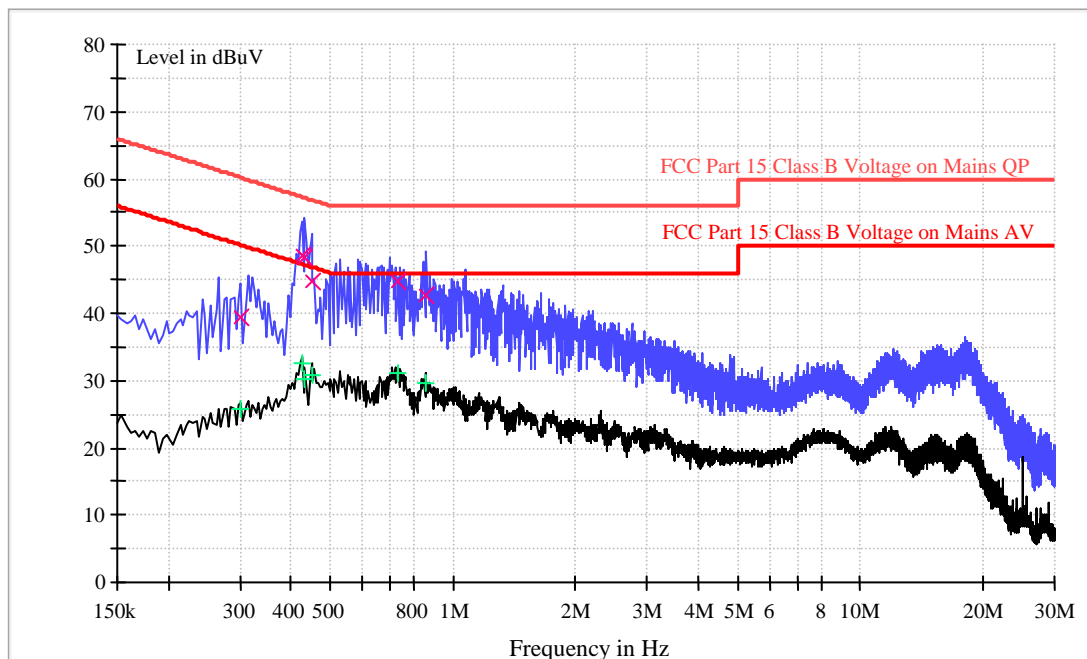
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Applicant: Huawei Technologies Co.,Ltd

Model: HG531 V1

Worst case operating Mode: Data transfer (AC/DC Adapter: Huntkey)

Conducted Emission Test – FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.302	39.4	N	10.2	20.8	60.2
0.426	48.6	N	10.2	8.7	57.3
0.434	48.3	N	10.2	8.9	57.2
0.450	44.8	N	10.2	12.1	56.9
0.734	44.8	N	10.3	11.2	56.0
0.862	42.7	N	10.3	13.3	56.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.302	25.8	N	10.2	24.4	50.2
0.426	32.4	N	10.2	14.9	47.3
0.434	30.1	N	10.2	17.1	47.2
0.450	30.7	N	10.2	16.2	46.9
0.734	31.0	N	10.3	15.0	46.0
0.862	29.6	N	10.3	16.4	46.0

TRF No.: FCC 15C_PC_b

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EXHIBIT 4
EQUIPMENT PHOTOGRAPHS

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4.0 Equipment Photographs

For electronic filing, photographs of the tested EUT are saved with filename: external photos.pdf and internal photos.pdf.

EXHIBIT 5
PRODUCT LABELLING

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5.0 **Product Labelling**

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

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EXHIBIT 6
TECHNICAL SPECIFICATIONS

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6.0 Technical Specifications

For electronic filing, the block diagram of the tested EUT is saved with filename: block.pdf.

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EXHIBIT 7

INSTRUCTION MANUAL

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7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold / leased in the United States.

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EXHIBIT 8

MISCELLANEOUS INFORMATION

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8.0 Miscellaneous Information

This miscellaneous information includes emission measuring procedure.

8.1 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Test Services in the measurements of computer peripheral operating under Part 15, Subpart B rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2009.

The computer equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The antenna height and polarization are varied during the Test to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions are in QP mode from the frequency band 30MHz to 1GHz with RBW setting 120kHz. Detector function for radiated emissions are in PK&AV mode from the frequency band above 1GHz with RBW setting 1MHz. Detector function for conducted emissions are in QP & AV mode and IFBW setting is 9kHz from the frequency band 150kHz to 30MHz.

For radiated emission, the frequency range scanned is 30MHz to 2GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

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8.1 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

Conducted measurements are made as described in ANSI C63.4 - 2009.

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EXHIBIT 9
CONFIDENTIALITY REQUEST

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9.0 **Confidentiality Request**

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

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EXHIBIT 10 TEST EQUIPMENT LIST

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10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	29-Jun-13	29-Jun-14
SZ185-01	EMI Receiver	R&S	ESCI	100547	12-Mar-13	12-Mar-14
SZ061-09	Horn Antenna	ETS	3115	00092346	28-Nov-12	28-Nov-13
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	12-Mar-13	12-Mar-14
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	12-Mar-13	12-Mar-14
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2-Mar-13	2-Mar-14
SZ062-02	RF Cable	RADIALL	RG 213U	--	20-Jul-13	20-Jan-14
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	20-Jul-13	20-Jan-14
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	20-Jul-13	20-Jan-14
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	5-Nov-12	5-Nov-13
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	5-Nov-12	5-Nov-13
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	5-Nov-12	5-Nov-13
SZ188-03	Shielding Room	ETS	RFD-100	4100	23-Aug-13	23-Aug-14