HUAWEI TECHNOLOGIES CO., LTD.

Application
For
Certification

FCC ID: FCC ID: QISAF23

LTE/3G Sharing Router

Model: AF23

Computer Peripheral

Report No.: SZ12090056-2

Prepared and Checked by:	Approved by:
Sign on file	Digitally signed by Billy Li Location: Intertek Testing Services
Eason He Engineer	Billy Li Supervisor Date: 22 October 2012

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MEASUREMENT / TECHNICAL REPORT

HUAWEI TECHNOLOGIES CO., LTD.
MODEL: AF23
FCC ID: FCC ID: QISAF23

22 October 2012

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

Equipment Type: JBP-Class B Computing Device Peripheral

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

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 ___X___

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-01-11 Edition] provision.

Report prepared by:

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List of attached file

Exhibit Type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated photos	radiated photos.pdf
Test Setup Photo	Conducted photos	conducted photos.pdf
External Photo	External Photos	external photos.pdf
Internal Photo	Internal Photos	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	Letter of Agency	agency.pdf
Cover Letter	Confidentiality Letter	request.pdf

EXHIBIT 1

GENERAL DESCRIPTION

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a LTE/3G Sharing Router. The device can be used to transfer data with PC directly connected through Ethernet port. The EUT is powered by AC Adapter (model: HW-050200U3W) through 120V/60Hz.

1.2 Related Submittal(s) Grants

This is an application for certification of a computer peripheral.

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).

EXHIBIT 2

SYSTEM TEST CONFIGURATION

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 is powered by AC Adapter (model: HW-050200U3W) 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 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. 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	T61
Hard Disk	Smart.drive	HD-003
USB Cable	Smart.drive	Unshielded, Length 155cm
1394 Cable	Smart.drive	Unshielded, Length 180cm
3G wireless network card	Huawei	EC 122
LAN Cable	N/A	Unshielded, Length: 200cm
AC Adapter	Huawei	HW-050200U3W (Input:100-240V,50/60Hz; Output: 5V, 2A)
USB Cable	Huawei	Unshielded, Length 120cm

EXHIBIT 3

EMISSION RESULTS

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.

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 dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
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 62.0dBμV 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 32dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0dBμV
AF = 7.4dB
CF = 1.6dB
AG = 29.0dB
PD = 0dB
AV = –10dB

FS = 62 + 7.4 + 1.6 – 29 + 0 + (–10) = 32dBμV/m

Level in μV/m = Common Antilogarithm [(32dBμV/m)/20] = 39.8μV/m

3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
At
1800.413MHz (PC Download 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 9.3dB margin (PC Download Mode)

TEST PERSONNEL:

Sign on file

Eason He Engineer
Typed/Printed Name

22 October 2012
Date

Company: HUAWEI TECHNOLOGIES CO., LTD.
Date of Test: 22 October 2012
Model: AF23
Operating Mode: PC Download

Radiated Emissions (30MHz~2GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	30.980	24.6	20.0	18.2	22.8	40.0	-17.2
Horizontal	106.145	25.9	20.0	8.3	14.2	43.5	-29.3
Horizontal	170.165	28.4	20.0	10.0	18.4	43.5	-25.1
Vertical	30.287	24.9	20.0	18.8	23.7	40.0	-16.3
Vertical	54.250	35.0	20.0	6.9	21.9	40.0	-18.1
Vertical	364.165	29.1	20.0	15.7	24.8	46.0	-21.2
Vertical	1800.413	35.3	20.0	29.4	44.7	54.0	-9.3

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.

Engineer: Eason He

3.4 Conducted Emission Configuration Photograph

Worst Case Live-Conducted Configuration
at
0.486 MHz (PC Download 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 13.4 dB margin (PC Download Mode)

TEST PERSONNEL:

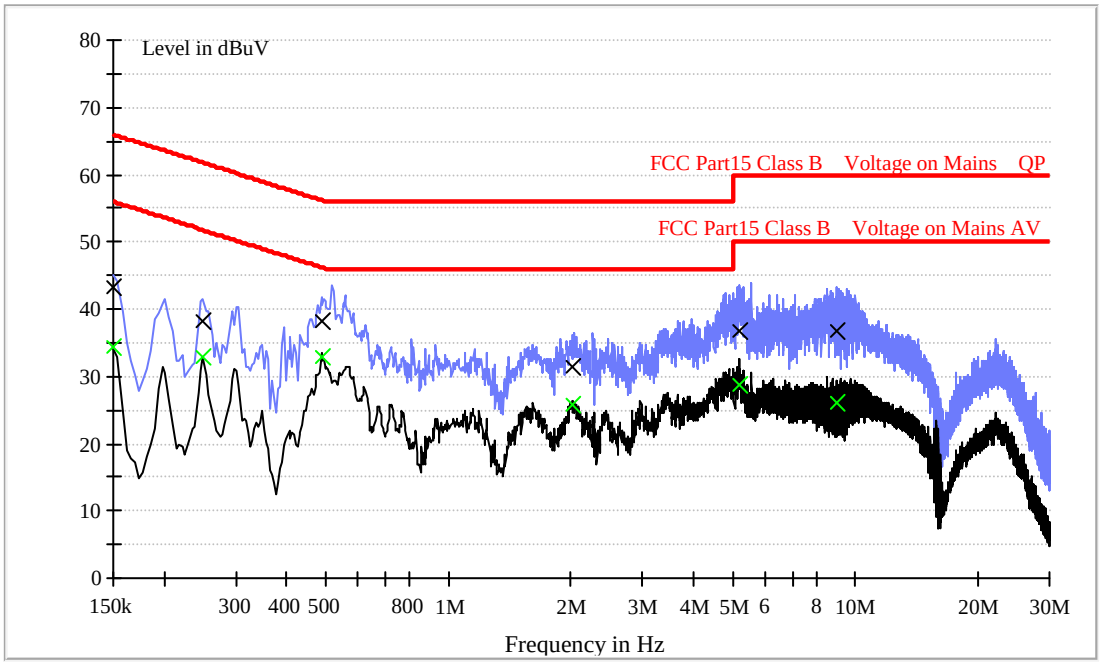
Sign on file

Eason He Engineer
Typed/Printed Name

22 October 2012
Date

Company: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
Model: AF23
Operating Mode: PC Download

Conducted Emission Test – FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.150	43.2	L1	9.6	22.8	66.0
0.250	38.3	L1	9.6	23.5	61.8
0.486	38.2	L1	9.6	18.0	56.2
2.010	31.4	L1	9.8	24.6	56.0
5.166	36.7	L1	9.8	23.3	60.0
8.994	36.9	L1	9.9	23.1	60.0

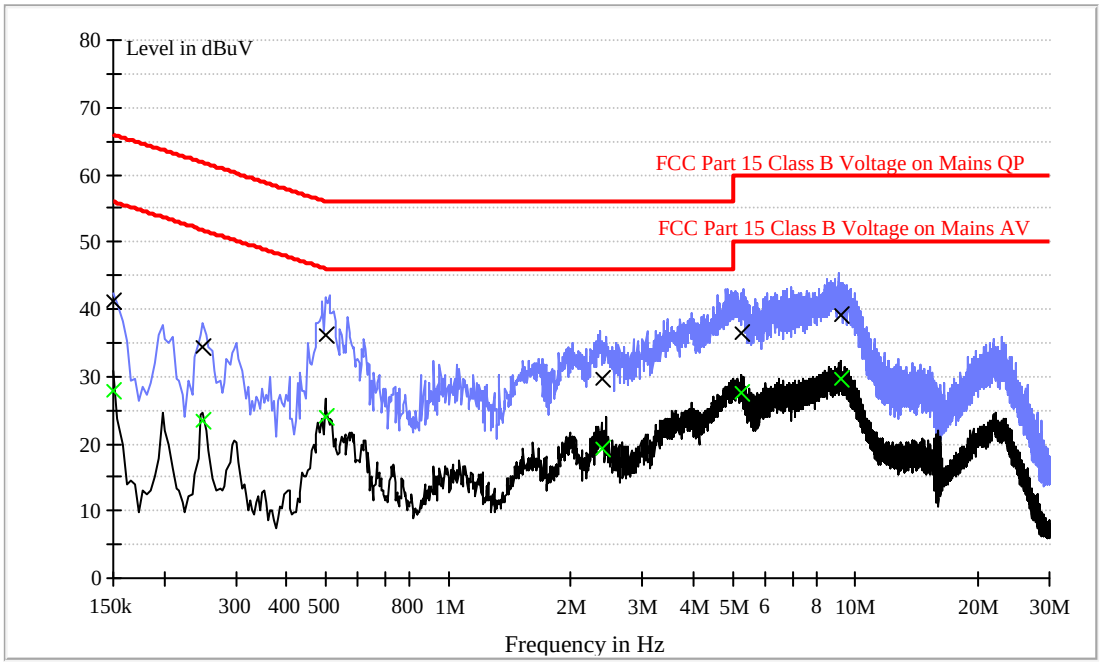
Result Table AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.150	34.5	L1	9.6	21.5	56.0
0.250	32.8	L1	9.6	19.0	51.8
0.486	32.8	L1	9.6	13.4	46.2
2.010	25.6	L1	9.8	20.4	46.0
5.166	28.8	L1	9.8	21.2	50.0
8.994	26.1	L1	9.9	23.9	50.0

Engineer: Eason He

Company: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
Model: AF23
Operating Mode: PC Download

Conducted Emission Test – FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.150	41.1	N	9.6	24.9	66.0
0.250	34.5	N	9.6	27.3	61.8
0.498	36.1	N	9.6	19.9	56.0
2.374	29.7	N	9.8	26.3	56.0
5.254	36.4	N	9.9	23.6	60.0
9.214	39.2	N	10.0	20.8	60.0

Result Table AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.150	27.7	N	9.6	28.3	56.0
0.250	23.4	N	9.6	28.4	51.8
0.498	23.9	N	9.6	22.1	46.0
2.374	19.4	N	9.8	26.6	46.0
5.254	27.4	N	9.9	22.6	50.0
9.214	29.7	N	10.0	20.3	50.0

Engineer: Eason He

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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

5.0 **Product Labelling**

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

EXHIBIT 6

TECHNICAL SPECIFICATIONS

6.0 Technical Specifications

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

EXHIBIT 7

INSTRUCTION MANUAL

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.

EXHIBIT 8

MISCELLANEOUS INFORMATION

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 peripheral 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.

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.

EXHIBIT 9

TEST EQUIPMENT LIST

9.0 **Test Equipment List**

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	30-Jun-12	30-Jun-13
SZ061-08	Horn Antenna	ETS	3115	00092346	15-Oct-12	15-Oct-13
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	11-Mar-12	11-Mar-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02 474	11-Mar-12	11-Mar-13
SZ185-01	EMI Receiver	R&S	ESCI	100547	11-Mar-12	11-Mar-13
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	03-Mar-12	03-Mar-13
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	12-Nov-11	12-Nov-12
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	10-Sep-12	10-Sep-13