

HUAWEI TECHNOLOGIES CO., LTD.

Application
For
Certification

FCC ID: QISAF23

LTE/3G Sharing Router

Model: AF23

WiFi Transceiver

Report No.: SZ12090056-1

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-11]

Prepared and Checked by:

Approved by:

Sign on file

Eason He
Engineer

Billy Li
Supervisor
Date: 22 October 2012

- 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_Tx_b

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MEASUREMENT/TECHNICAL REPORT

HUAWEI TECHNOLOGIES CO., LTD. - MODEL: AF23

FCC ID: QISAF23

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

Equipment Type: DTS - Part 15 Digital Transmission Systems (WiFi transmitter portion)

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 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
Cover Letter	Letter of Agency	agency.pdf
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
Schematics	Circuit Diagram	circuit.pdf
Operation Description	Technical Description	descri.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf

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EXHIBIT 1

SUMMARY OF TEST RESULTS

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1.0 Summary of Test

HUAWEI TECHNOLOGIES CO., LTD. - MODEL: AF23

FCC ID: QISAF23

TEST	REFERENCE	RESULTS
Max. Output power	15.247(b)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

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EXHIBIT 2

GENERAL DESCRIPTION

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2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a LTE/3G Sharing Router with internal WiFi function operating at 2412-2462MHz for 802.11b/g/n-HT20, 11 channels with 5MHz channel spacing. EUT operated at 2422-2452MHz for 802.11n-HT40, 7 channels with 5MHz channel spacing. It is powered by AC Adapter (model: HW-050200U3W) through 120V/60Hz. For more detailed features description, please refer to the user's manual.

Type of Modulation: BPSK, QPSK, 16QAM and 64QAM.

Antenna Type: Integral Antenna.

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

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2.2 Related Submittal(s) Grants

This is an application for certification of:

DTS- Part 15 Digital Transmission Systems (WiFi transmitter portion)

Remaining portions are subject to the following procedures:

1. Receiver portion of WiFi: exempt from technical requirement of this Part.
2. Data Transfer and other function: (Report No.: SZ12090056-2, SZ12090056-3).

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009) and KDB 558074. 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. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, 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 3

SYSTEM TEST CONFIGURATION

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3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. It was powered by AC Adapter (model: HW-050200U3W) through 120V/60Hz during the test. Only the worst case data was reported.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing 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 testing.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

Power Parameters of IEEE 802.11b/g/n

Test software setting of IEEE 802.11b/g/n			
Channel No.	Output Power	Data rate	Modulation type
1,6,11	8.0	802.11b: 1-11Mbps	802.11b: BPSK
	9.0	802.11g: 6-54Mbps	802.11g: BPSK, QPSK, 16QAM
1,6,11	11.0	802.11n-20M: 6.5-130Mbps	802.11n: BPSK, QPSK, 16QAM,
3,6,9	11.0	802.11n-40M: 13.5-270Mbps	802.11n: BPSK, QPSK, 16QAM, 64QAM

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On 802.11b/g mode, only one antenna is used for transmission; on 802.11n (20MHz & 40MHz) mode, both antennas can be used for transmission.

3.3 Special Accessories

N/A

3.4 Measurement Uncertainty

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

Uncertainty and Compliance – Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

3.5 Equipment Modification

Any modifications installed previous to testing by HUAWEI TECHNOLOGIES CO., LTD. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

3.6 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

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EXHIBIT 4

MEASUREMENT RESULTS

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Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
Model: AF23

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

- The antenna power of the EUT was connected to the input of a spectrum analyzer. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

- The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set according to the FCC KDB 558074 spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges and power was read directly in dBm. External attenuation and cable loss were compensated from the measured value.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

IEEE 802.11b (Antenna Gain < 2.1dBi) (BPSK, 1Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	14.28	26.79
Middle Channel: 2437	15.36	34.36
High Channel: 2462	13.97	24.95

IEEE 802.11g (Antenna Gain < 2.1dBi) (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	16.80	47.86
Middle Channel: 2437	17.60	57.54
High Channel: 2462	16.56	45.29

IEEE 802.11n 20M (MIMO)(Antenna Gain < 5.1dBi) (16QAM, 13Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	18.67	73.63
Middle Channel: 2437	19.53	89.74
High Channel: 2462	19.02	79.80

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IEEE 802.11n 40M (MIMO) (Antenna Gain < 5.1dBi) (64QAM, 27Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2422	19.01	79.64
Middle Channel: 2437	19.25	84.16
High Channel: 2452	19.15	82.23

Note 1: For MIMO system of 802.11n 20MHz and 40MHz, total power is calculated by combining the output power of each antenna according to KDB662911.

Note 2: In MIMO, two WiFi Antenna are correlated, Directional gain = $G_{ANT} + 10 \log(N)$
dBi = 2.1 + 10 log(2) = 5.1 dBi according to KDB662911.

Cable loss: 0.3 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

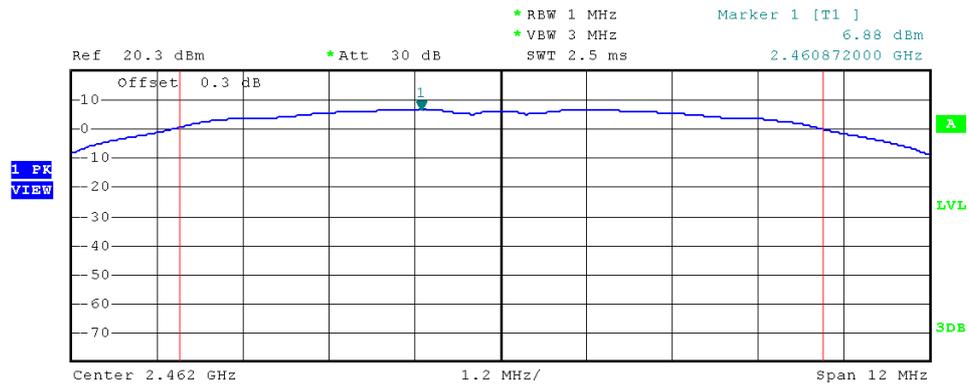
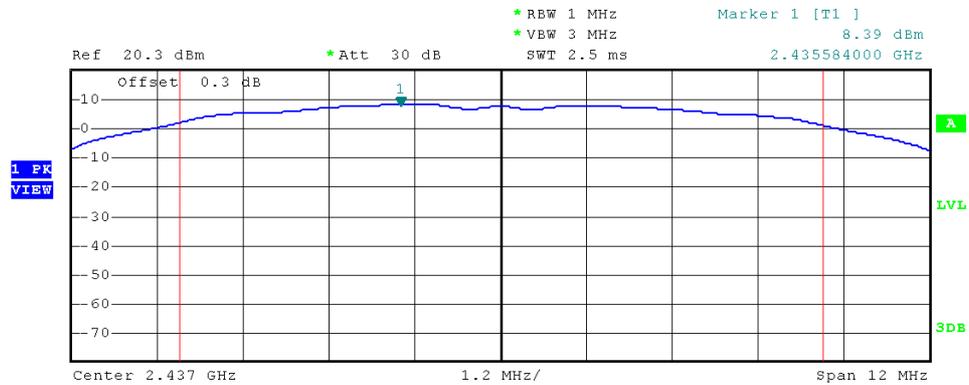
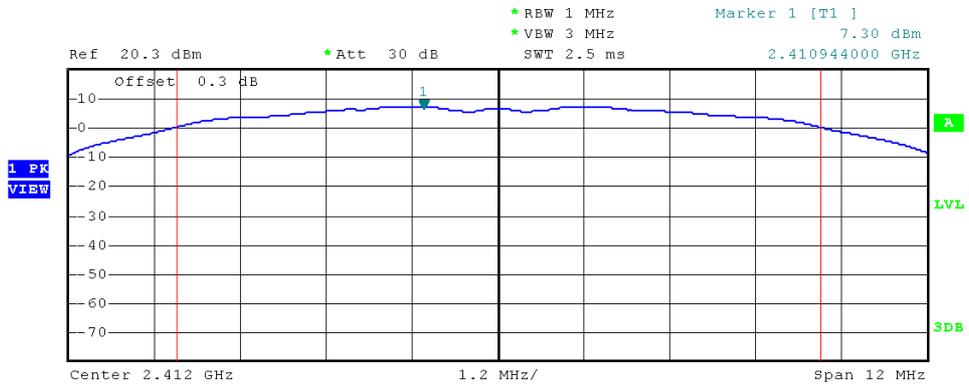
EUT dBm max. output level = 19.53dBm

For RF Exposure, the information is saved with filename: RF exposure.pdf.

The test plots are attached as below.

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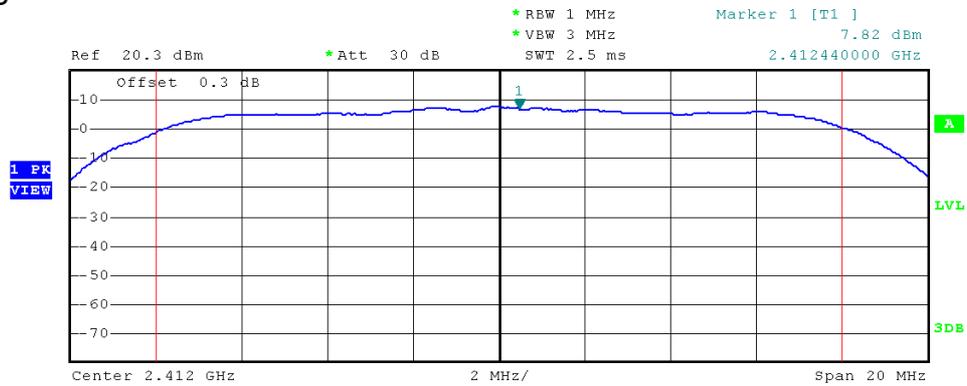
802.11b



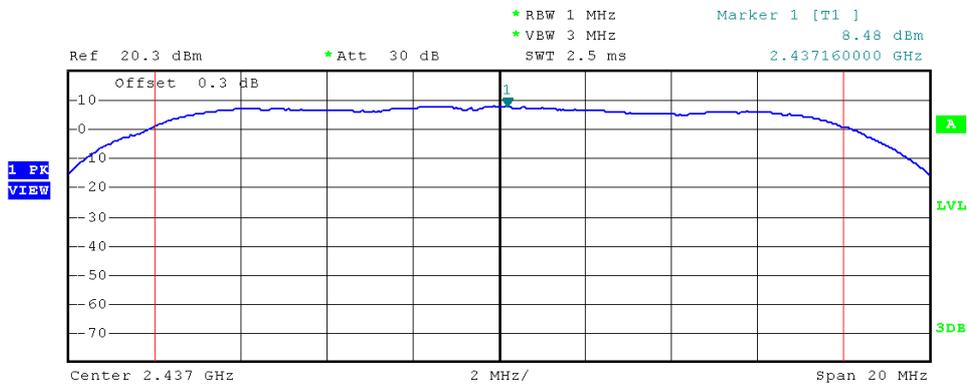
TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

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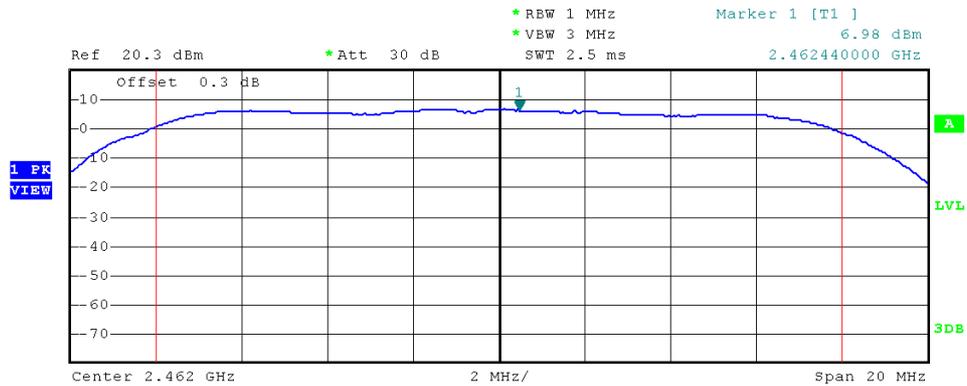
802.11g



Tx Channel
 Bandwidth 16 MHz Power 16.80 dBm



Tx Channel
 Bandwidth 16 MHz Power 17.60 dBm



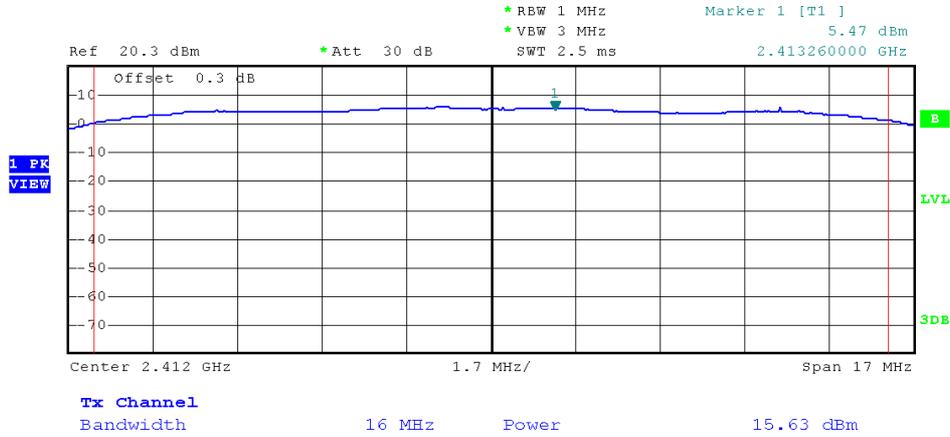
Tx Channel
 Bandwidth 16 MHz Power 16.56 dBm

TRF no.: FCC 15C_TX_b
 FCC ID: QISAF23
 Report No.: SZ12090056-1

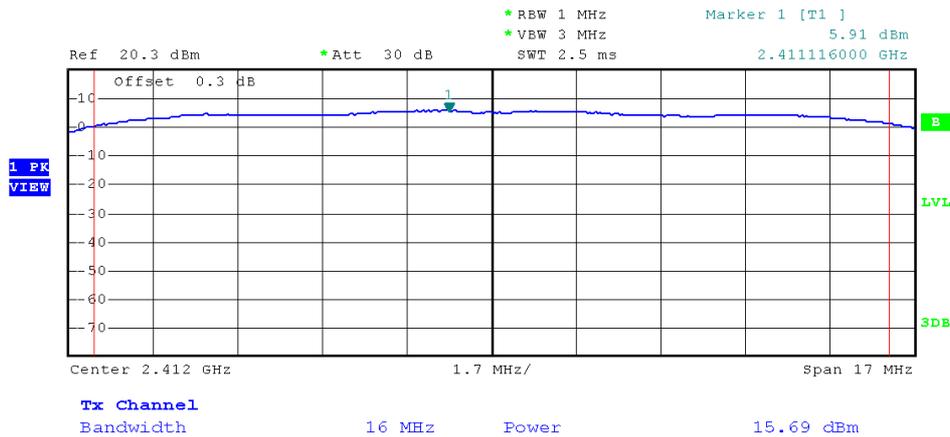
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802.11n (HT-20) MIMO

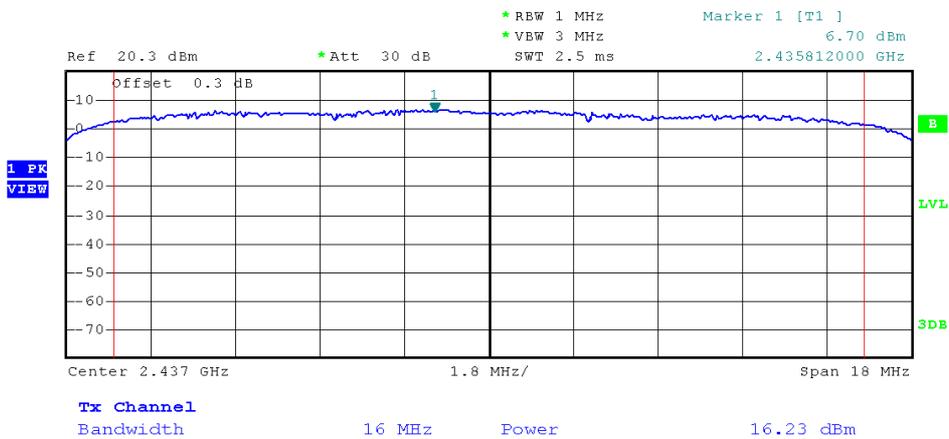
Channel 01 ANT 0



Channel 01 ANT 1

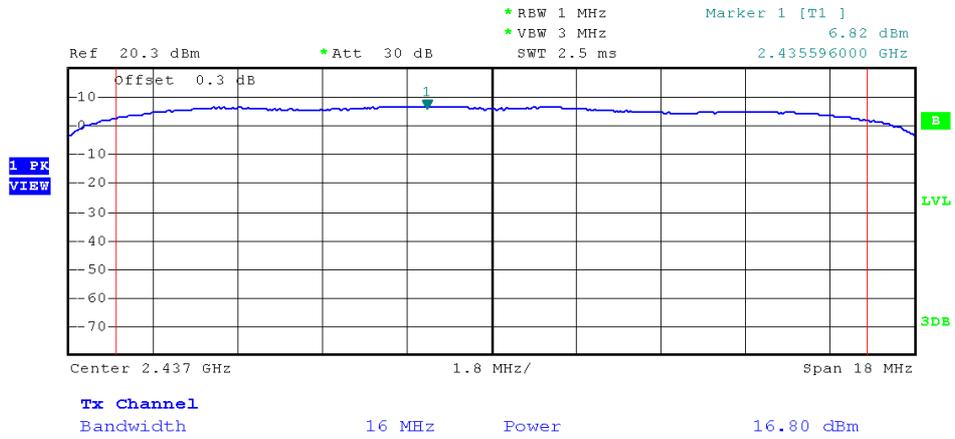


Channel 06 ANT 0

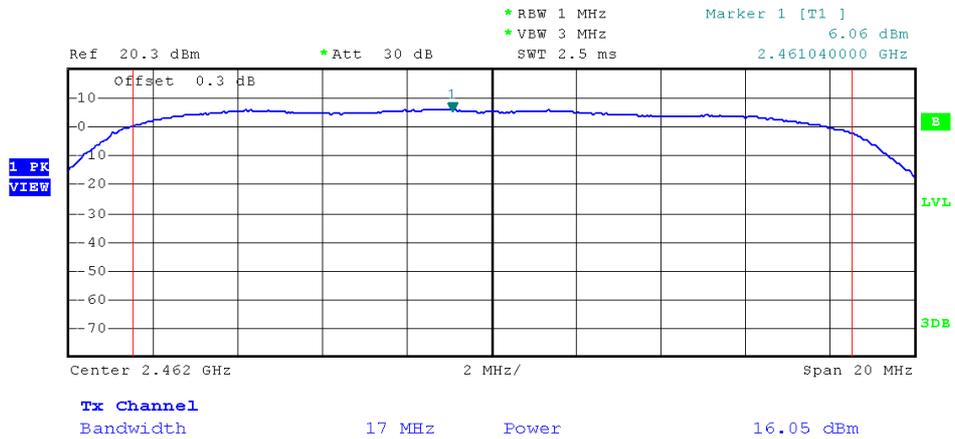


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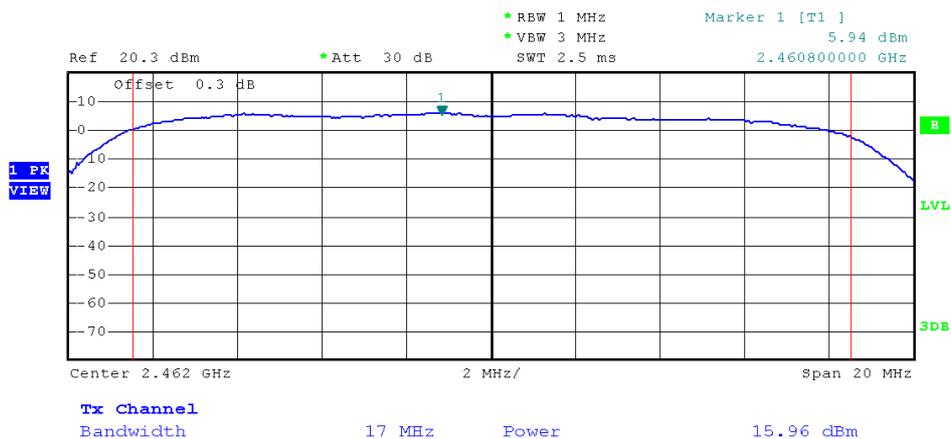
Channel 06 ANT 1



Channel 11 ANT 0

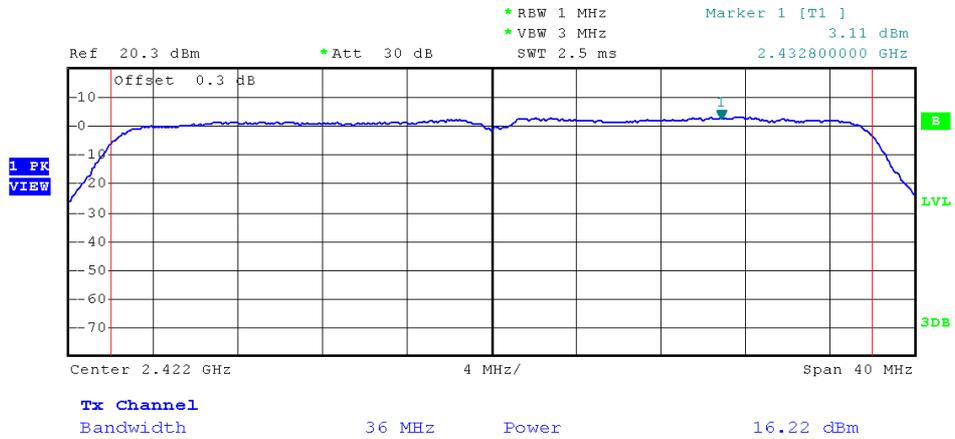


Channel 11 ANT 1

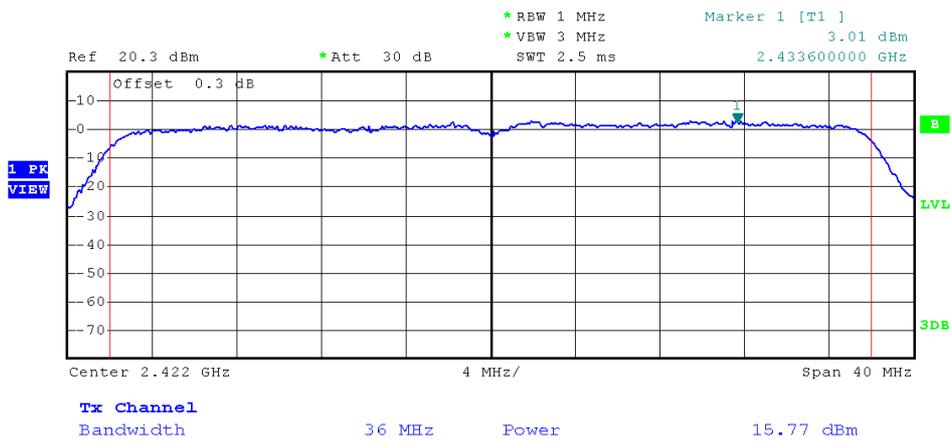


INTERTEK TESTING SERVICES

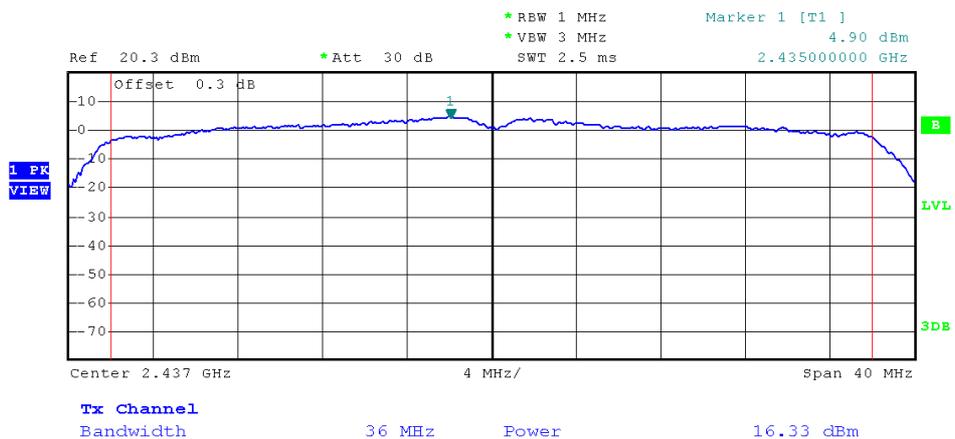
802.11n (HT-40) MIMO
Channel 03 ANT 0



Channel 03 ANT 1



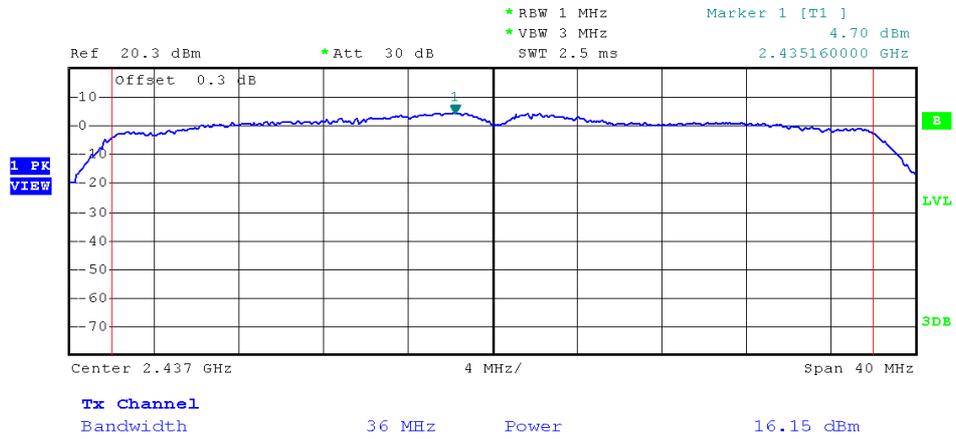
Channel 06 ANT 0



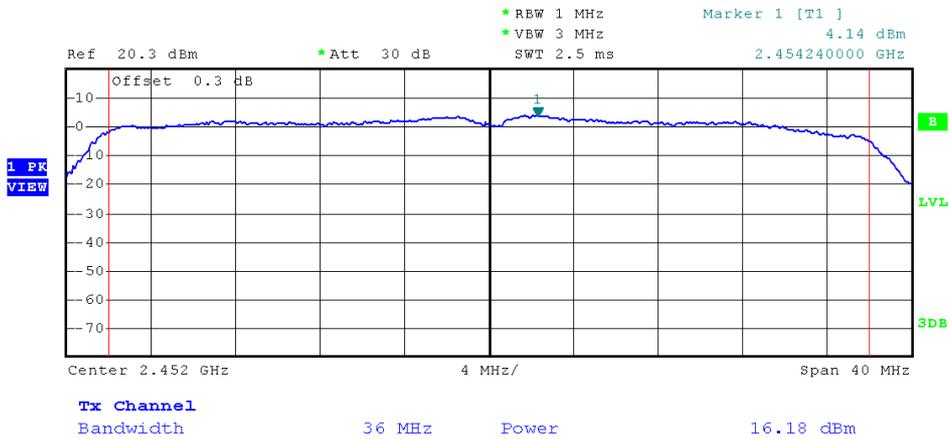
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FCC ID: QISAF23
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INTERTEK TESTING SERVICES

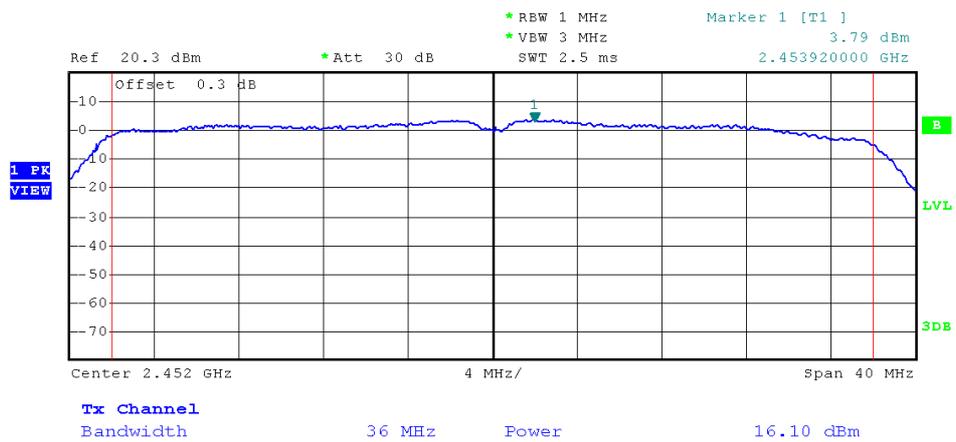
Channel 06 ANT 1



Channel 09 ANT 0



Channel 09 ANT 1



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Applicant: HUAWEI TECHNOLOGIES CO., LTD.
Model: AF23

Date of Test: 22 October 2012

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 1-5 % of the emission bandwidth and not to exceed 100 KHz according to FCC KDB 558074. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

IEEE 802.11b (BPSK, 1Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	8.16
2437	8.60
2462	8.16

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	15.16
2437	15.16
2462	15.20

IEEE 802.11n 20M MIMO(16QAM, 13Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	15.16
2437	15.20
2462	16.12

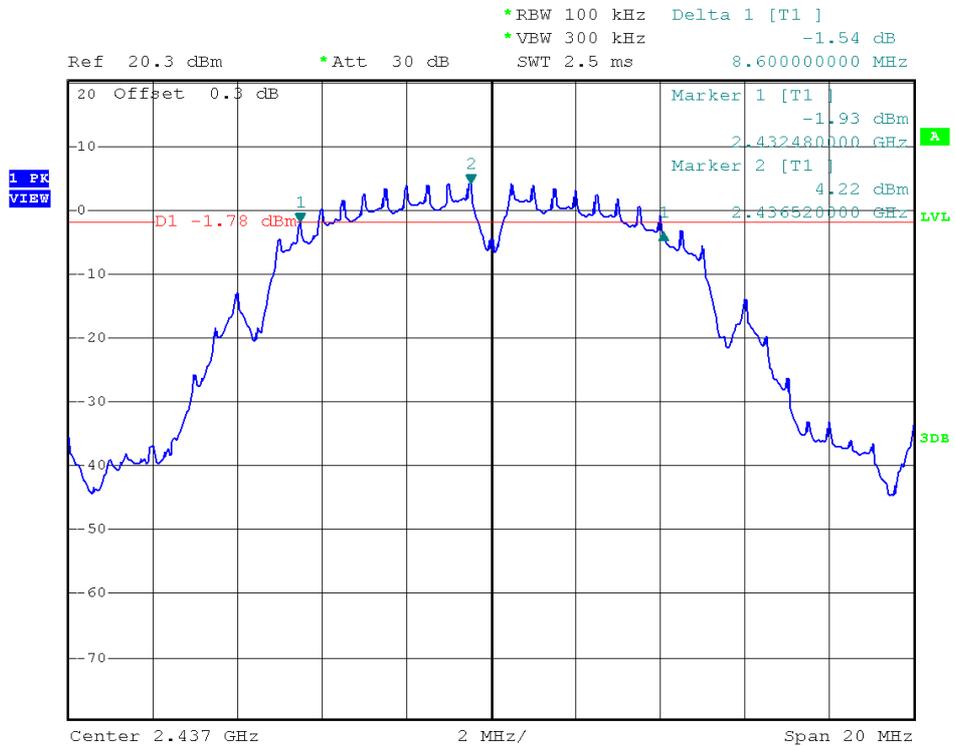
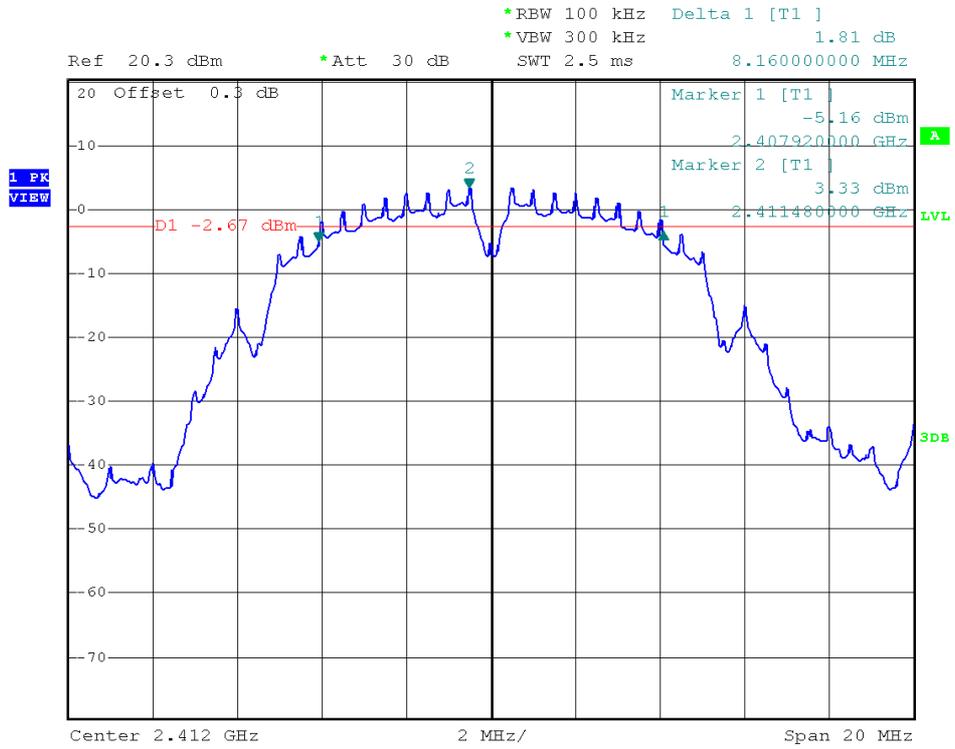
INTERTEK TESTING SERVICES

IEEE 802.11n 40M MIMO(64QAM, 27Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2422	35.32
2437	35.20
2452	35.84

The test plots are attached as below.

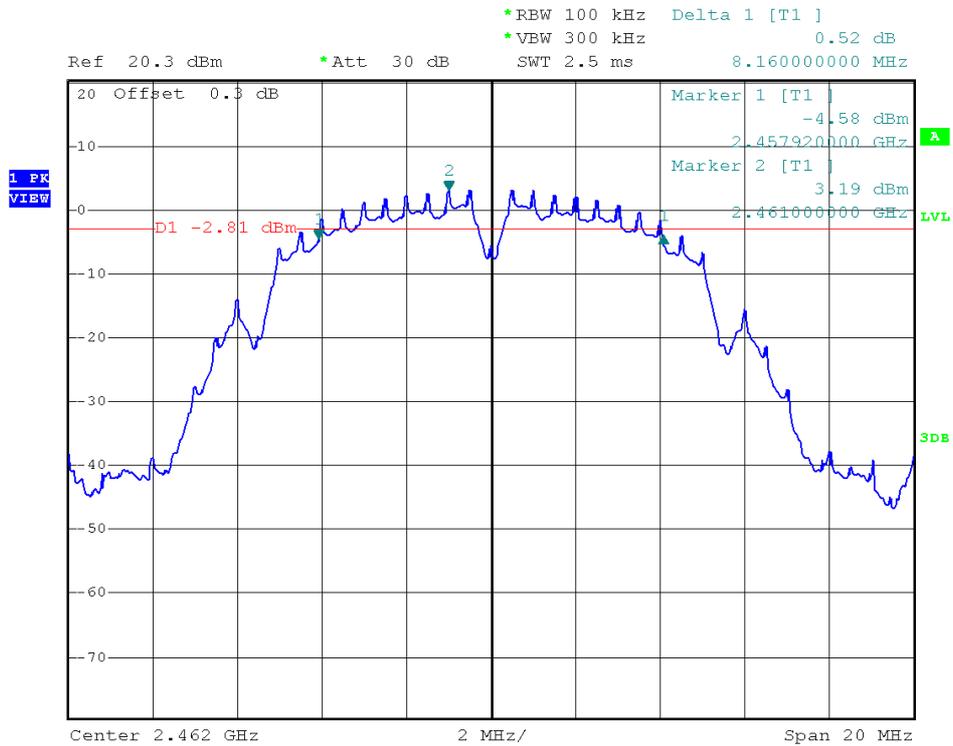
INTERTEK TESTING SERVICES

802.11b



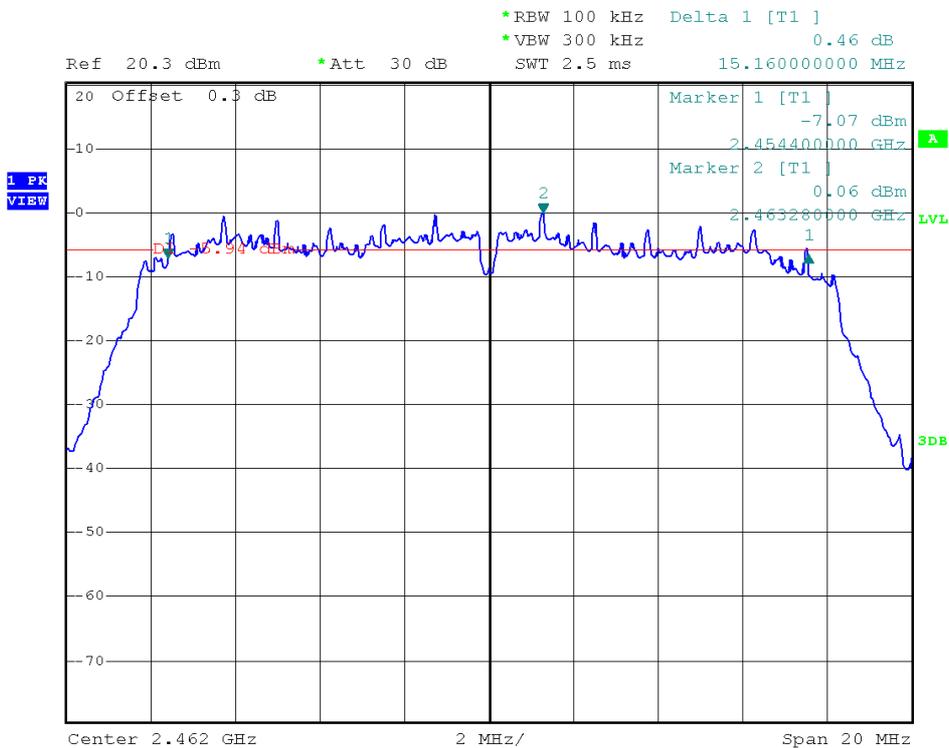
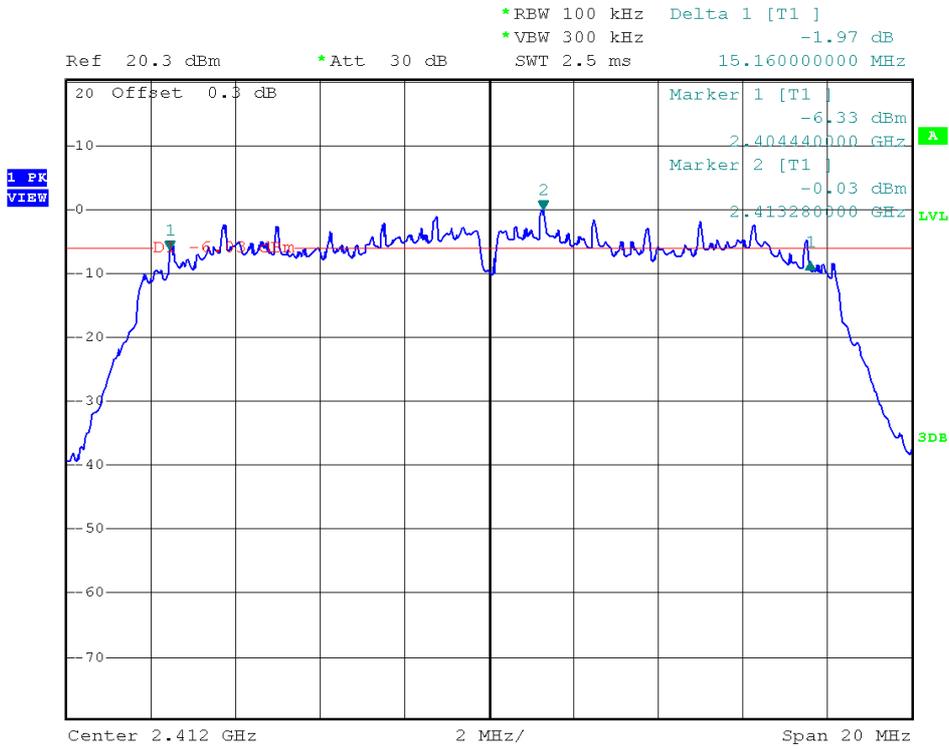
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FCC ID: QISAF23
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INTERTEK TESTING SERVICES



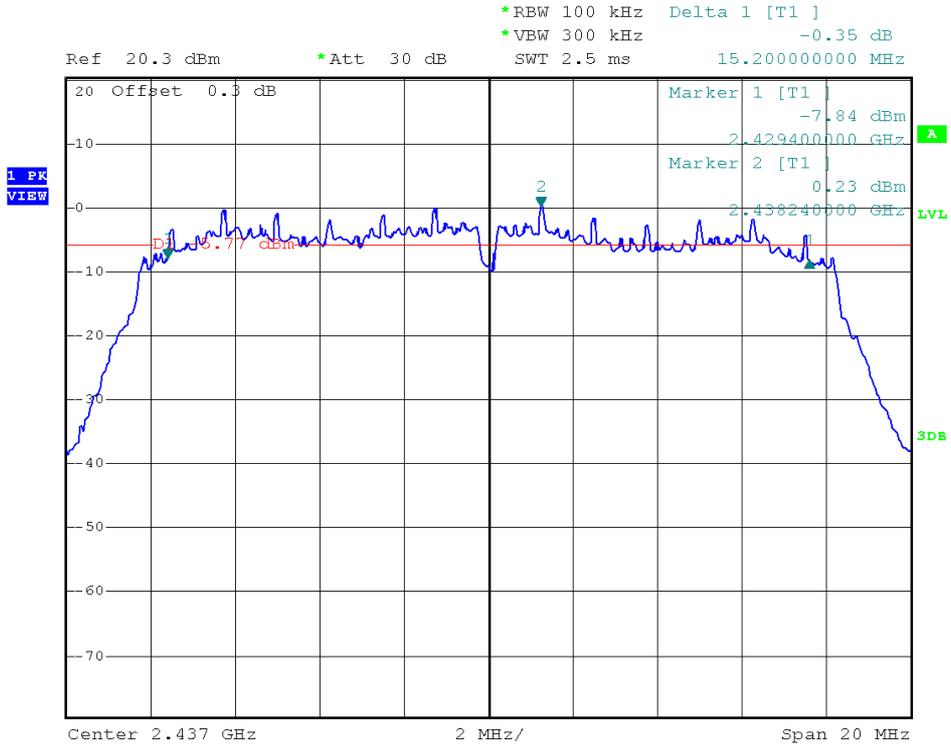
INTERTEK TESTING SERVICES

802.11g



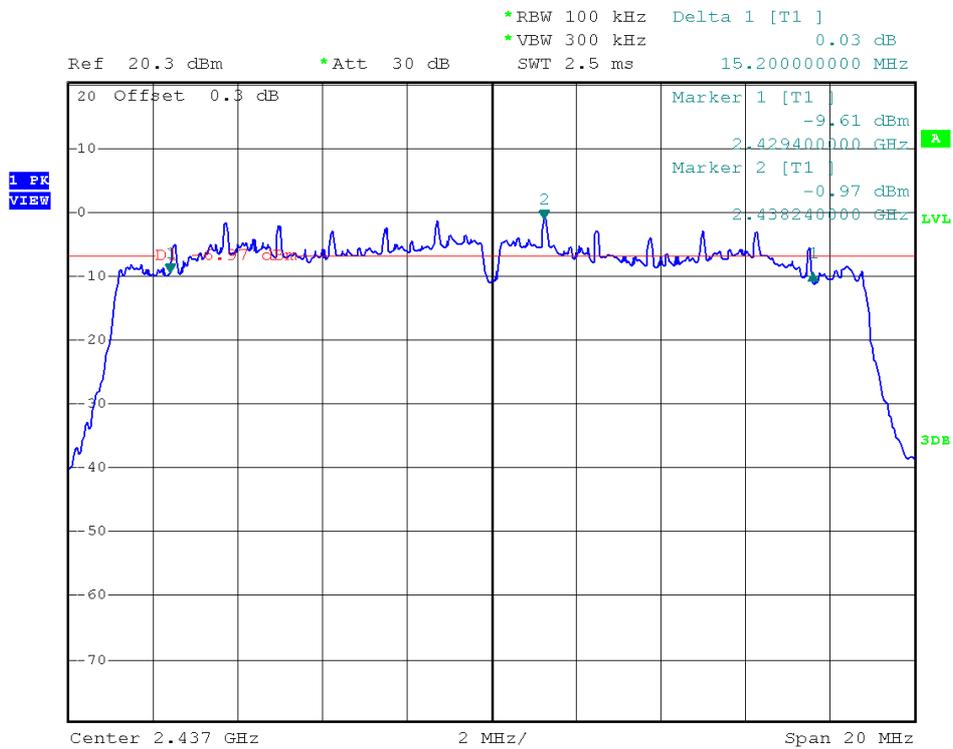
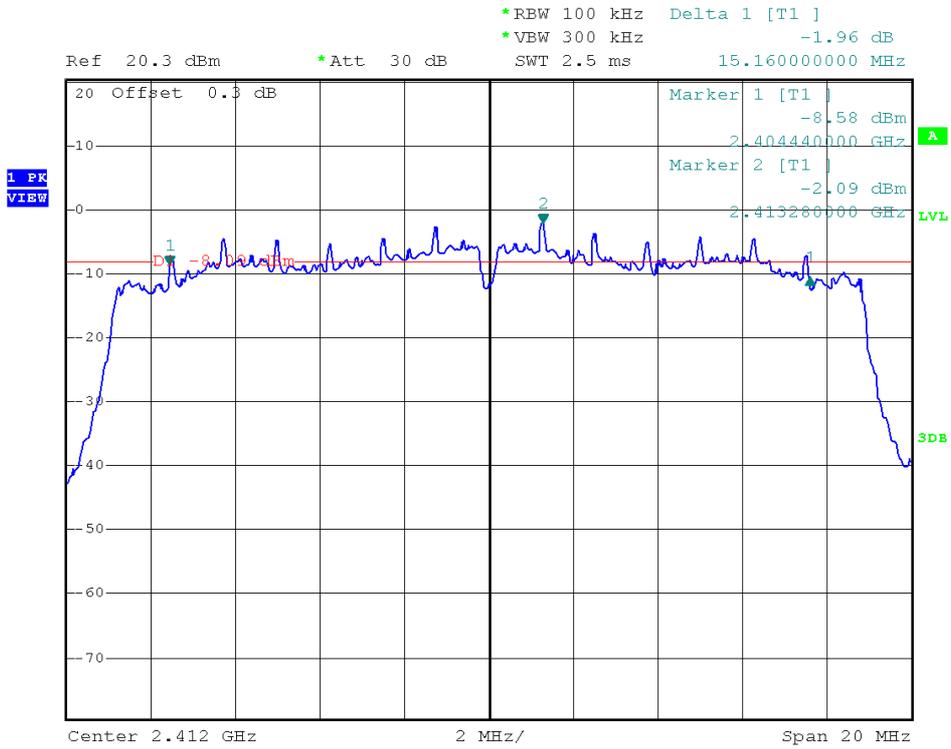
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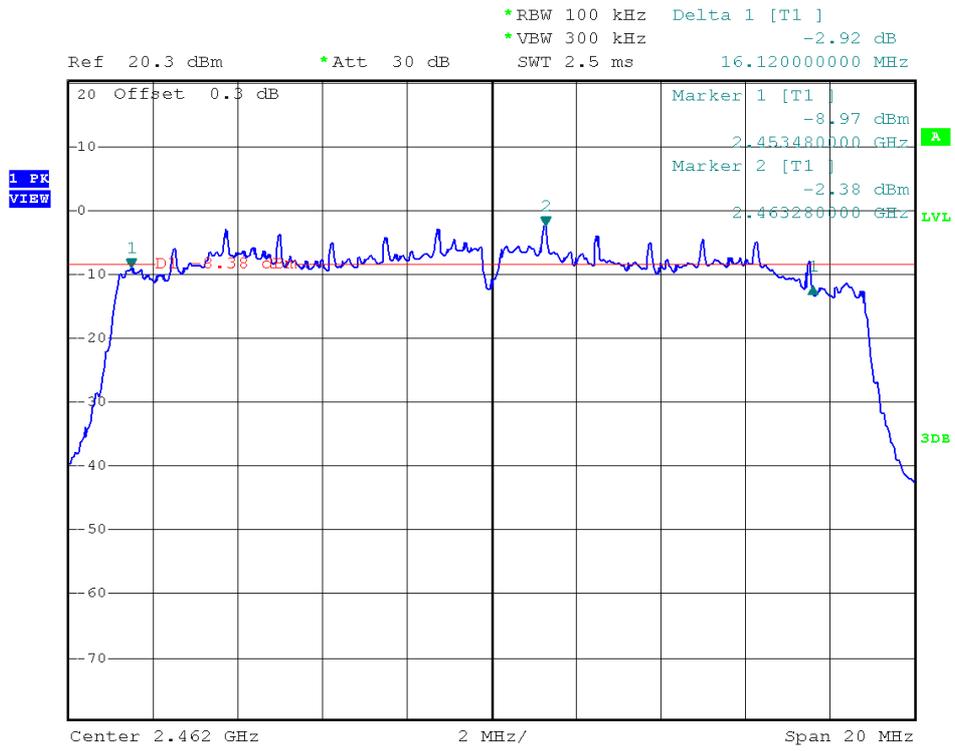
INTERTEK TESTING SERVICES

802.11n (HT-20) MIMO



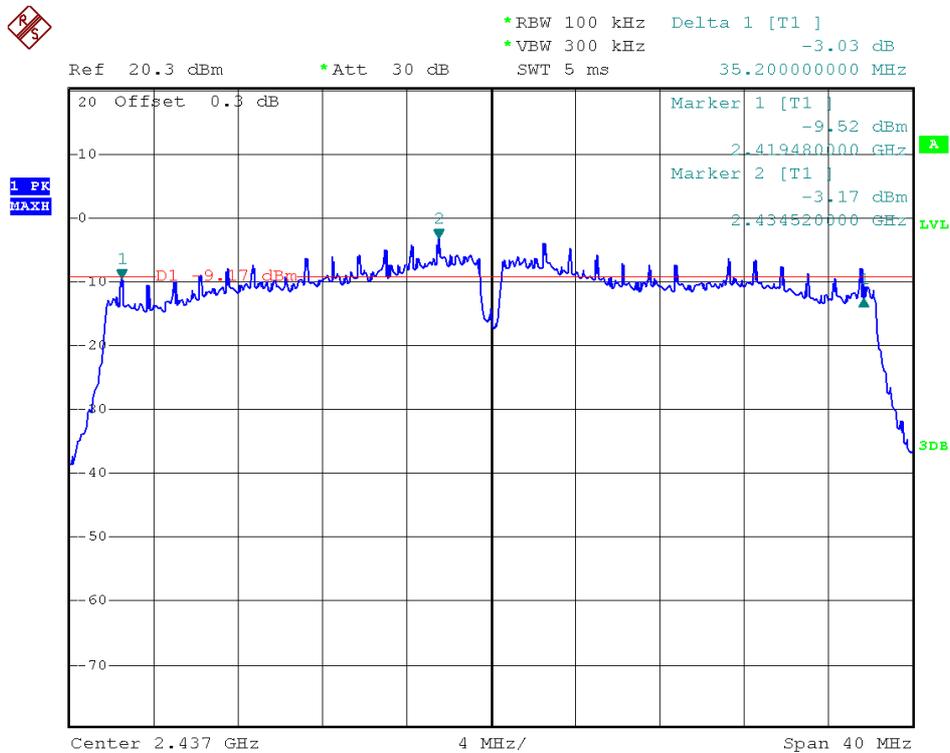
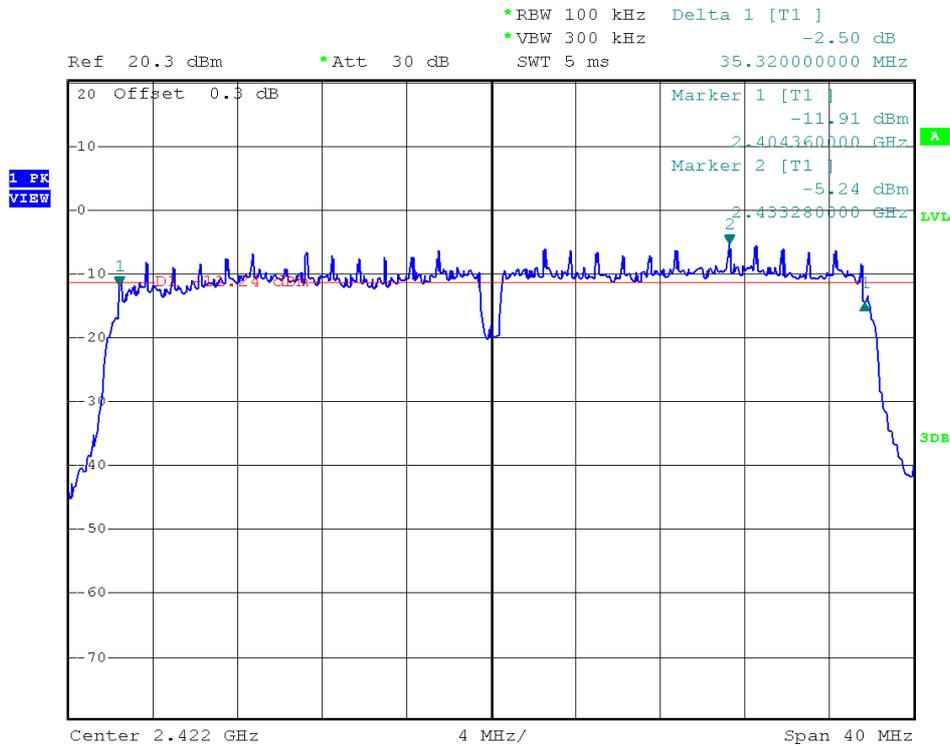
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FCC ID: QISAF23
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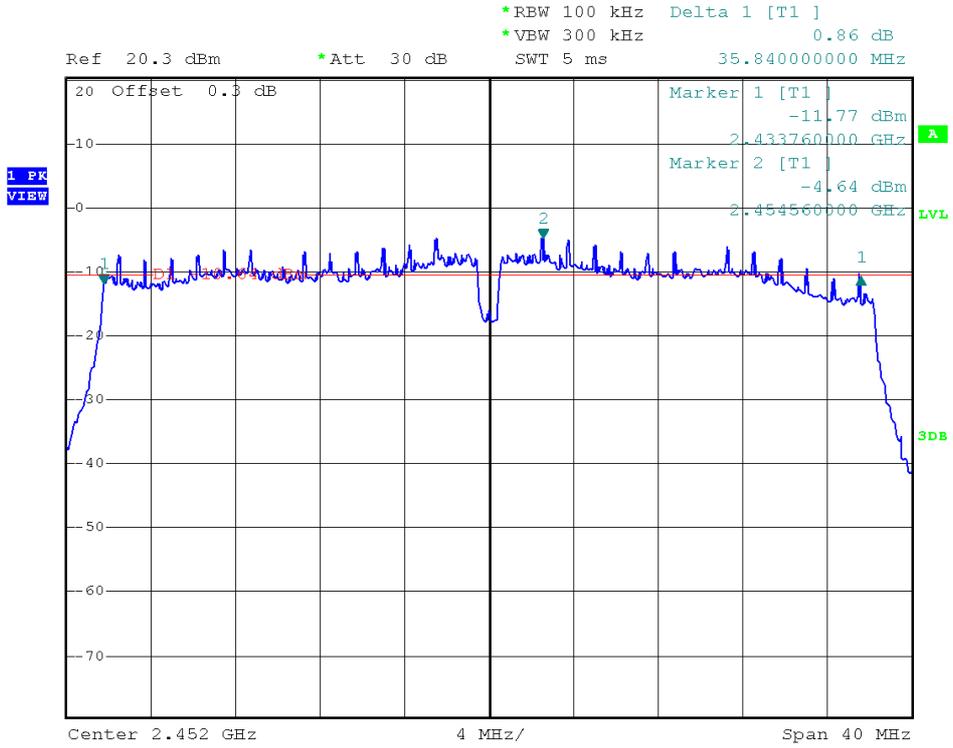
INTERTEK TESTING SERVICES

802.11n (HT-40) MIMO



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES



INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.
Model: AF23

Date of Test: 22 October 2012

4.3 Maximum Power Density Reading, FCC Rule 15.247(e) :

The Measurement Procedure PKPSD was set according to the FCC KDB 558074.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

For MIMO system, both the antenna ports is checked, the worst case power density is calculated from the method of Measure by adding $10\log(2)$ according KDB662911.

Limit: The Power Density does not exceed 8dBm/ 3 kHz.

IEEE 802.11b (BPSK, 1Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	3.13 dBm
2437	4.01 dBm
2462	2.94 dBm

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	-0.47 dBm
2437	0.32 dBm
2462	-0.80 dBm

IEEE 802.11n 20M MIMO (16QAM, 13Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz(Antenna 0+ Antenna 1)
2412	0.98 dBm
2437	1.89 dBm
2462	0.62 dBm

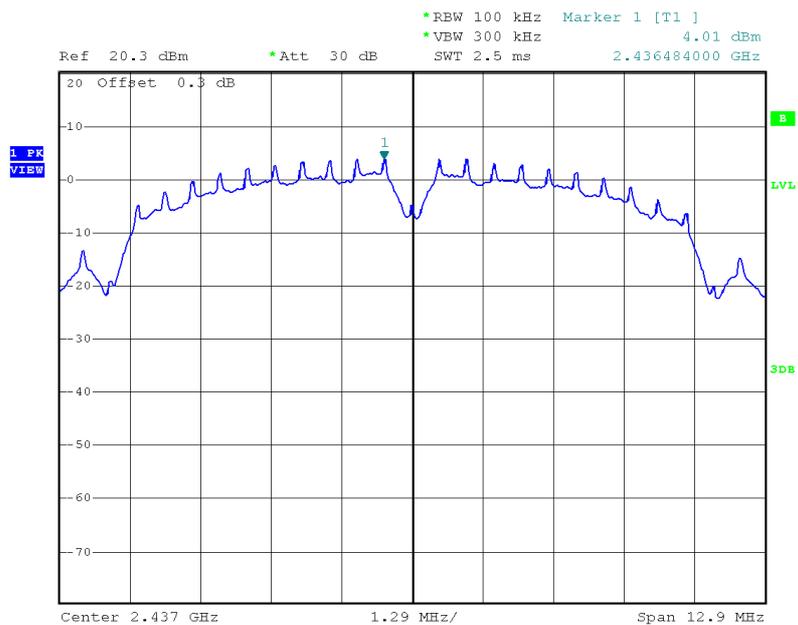
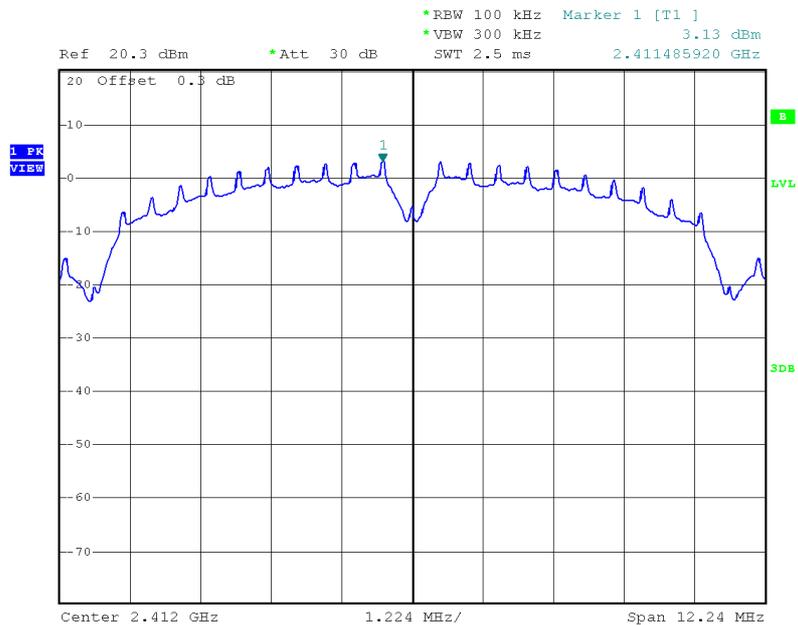
INTERTEK TESTING SERVICES

IEEE 802.11n 40M MIMO (64QAM, 27Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz (Antenna 0+ Antenna 1)
2422	-2.53 dBm
2437	-0.61 dBm
2452	-1.65 dBm

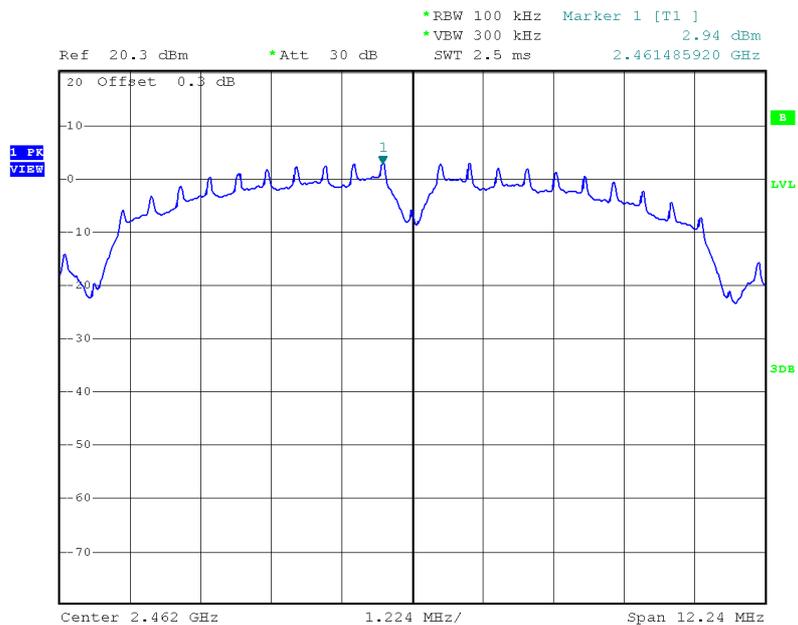
The test plots are attached as below.

INTERTEK TESTING SERVICES

802.11b

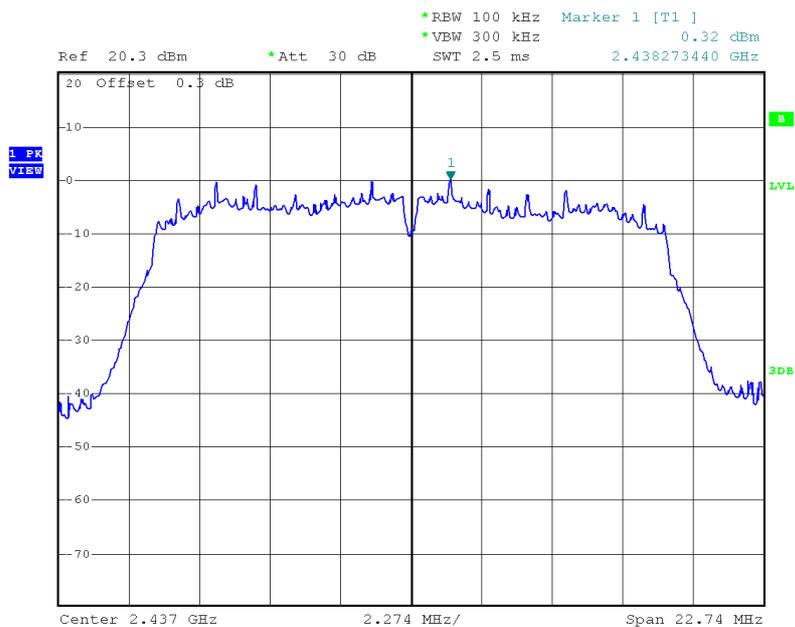
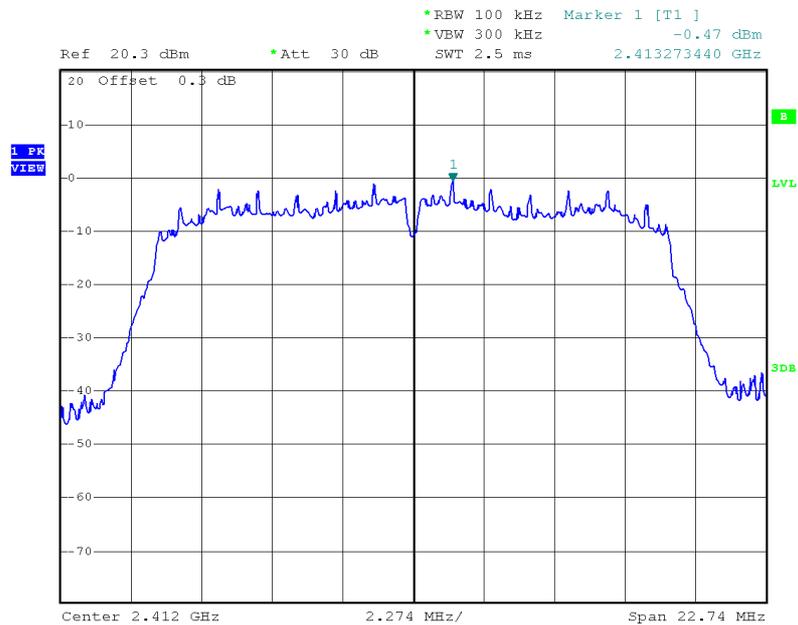


INTERTEK TESTING SERVICES

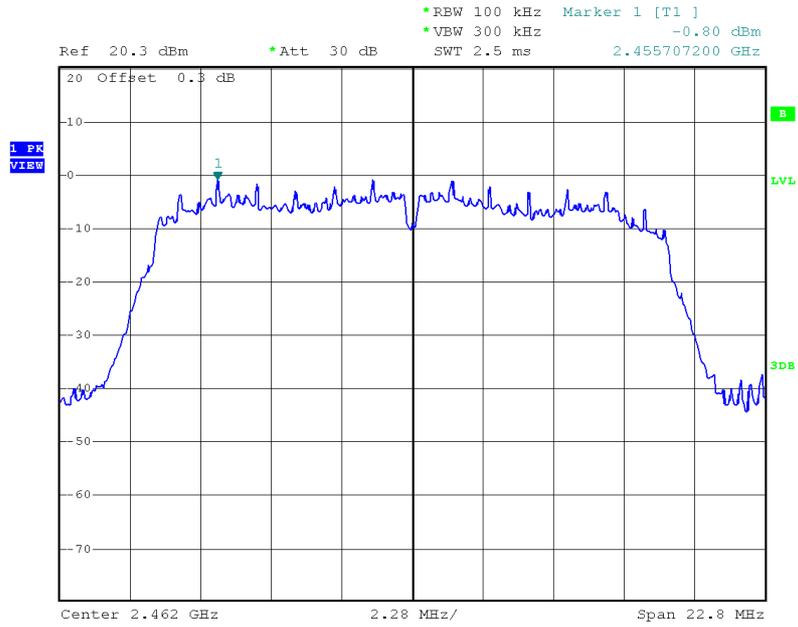


INTERTEK TESTING SERVICES

802.11g

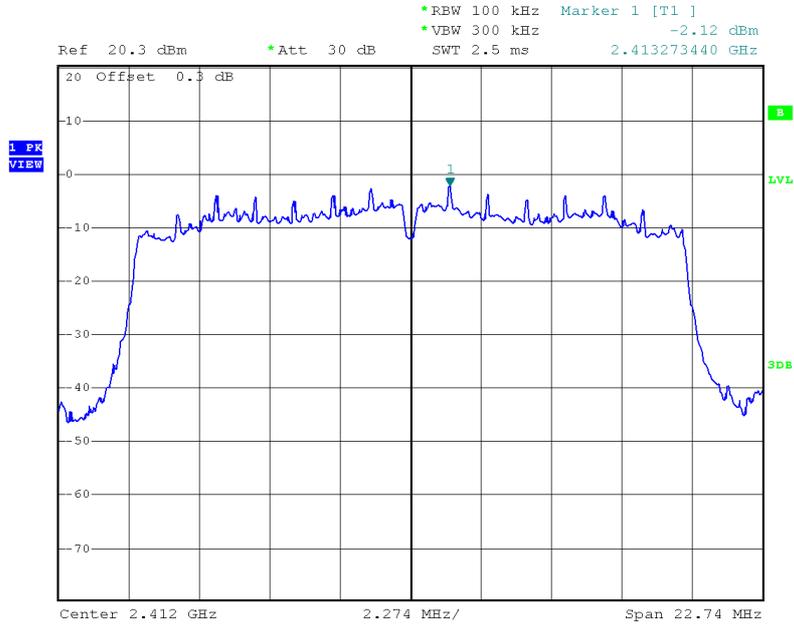


INTERTEK TESTING SERVICES

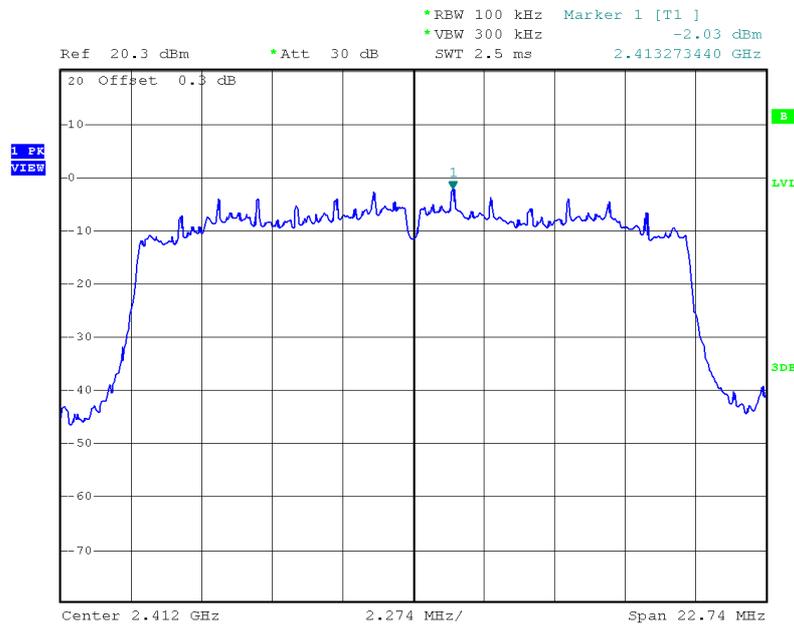


INTERTEK TESTING SERVICES

802.11n (HT-20) MIMO
Channel 01 ANT 0



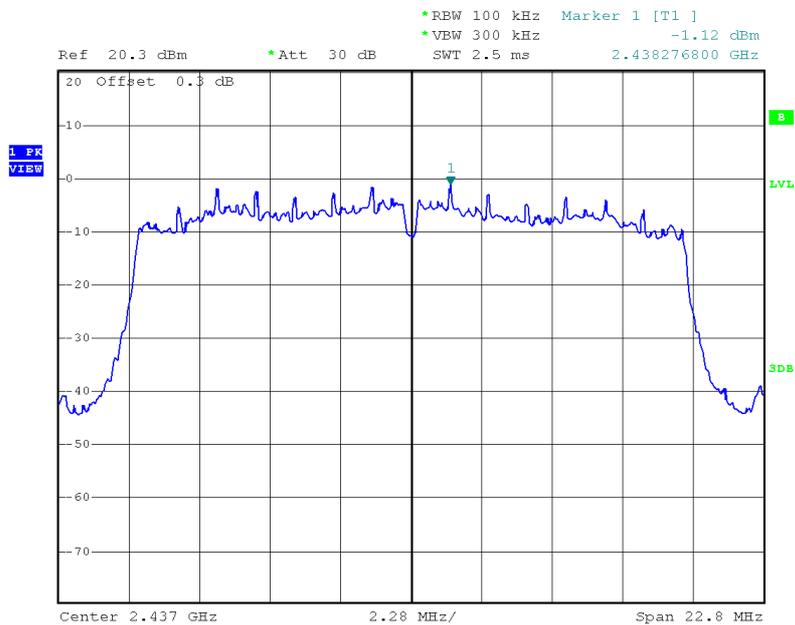
Channel 01 ANT 1



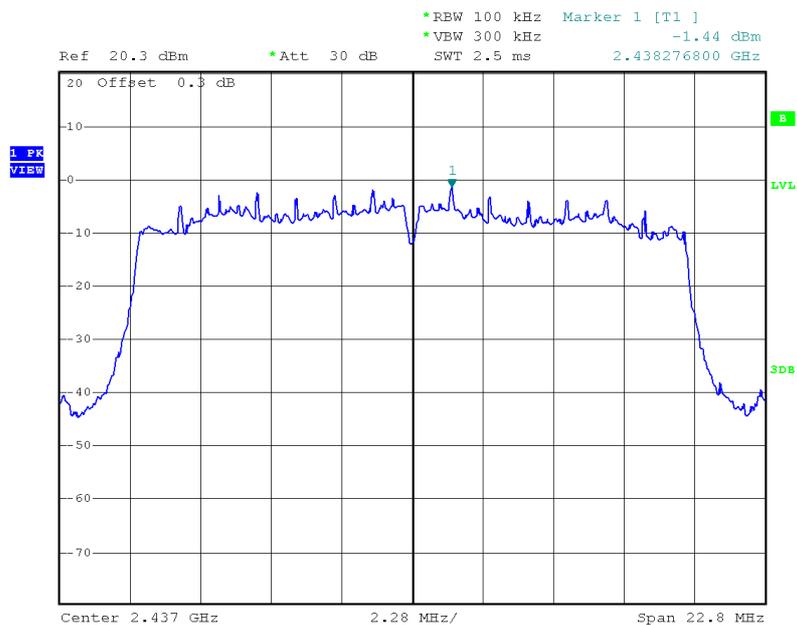
TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

Channel 06 ANT 0

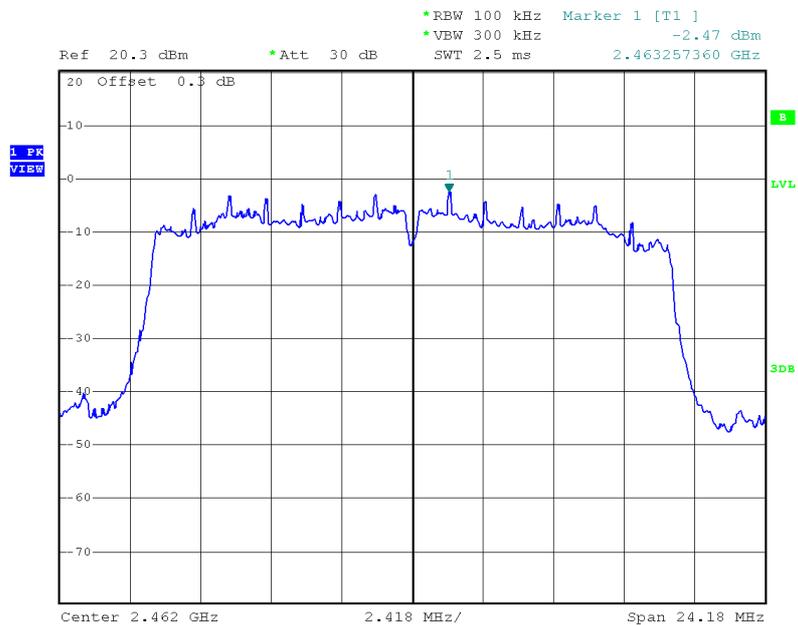


Channel 06 ANT 1

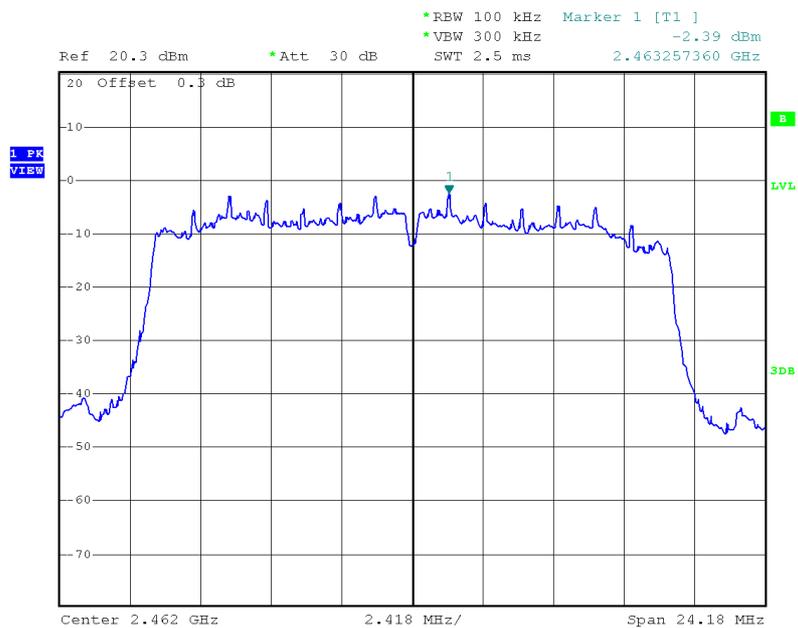


INTERTEK TESTING SERVICES

Channel 11 ANT 0

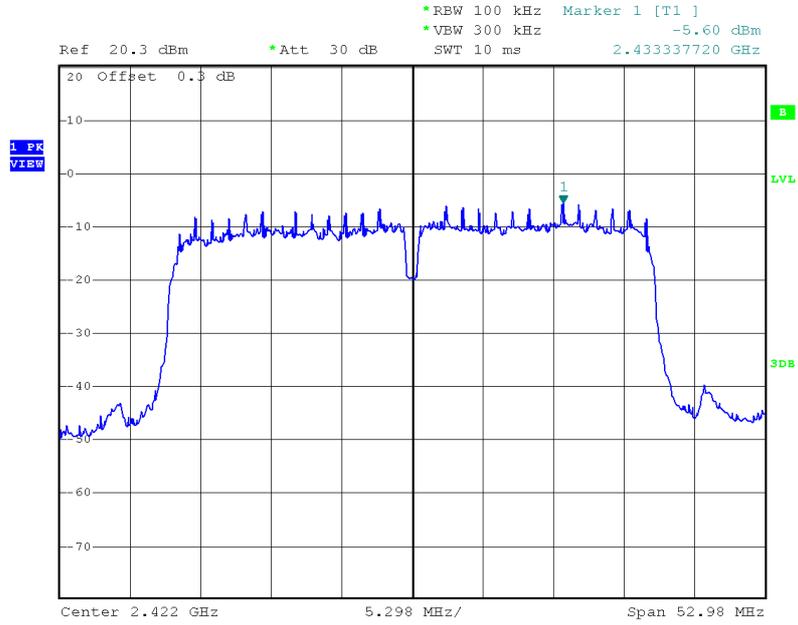


Channel 11 ANT 1

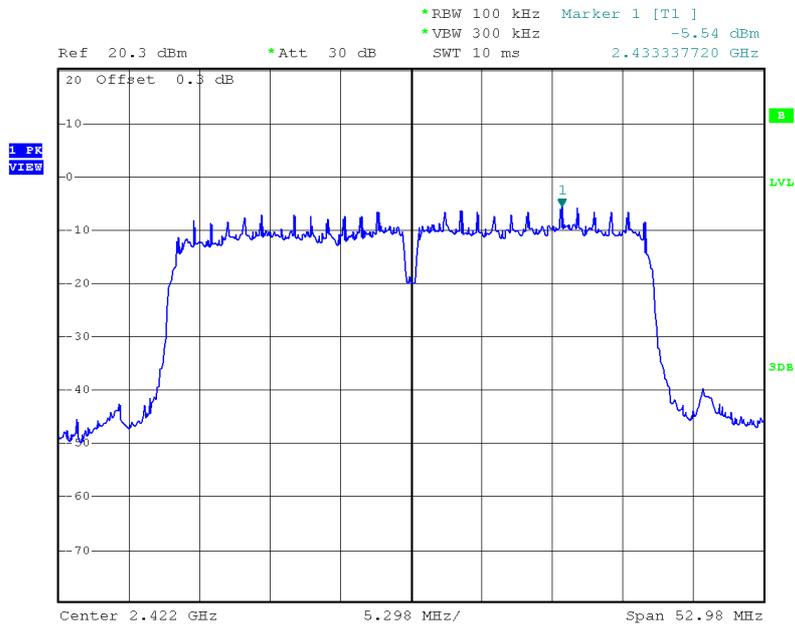


INTERTEK TESTING SERVICES

802.11n (HT-40) MIMO
Channel 03 ANT 0



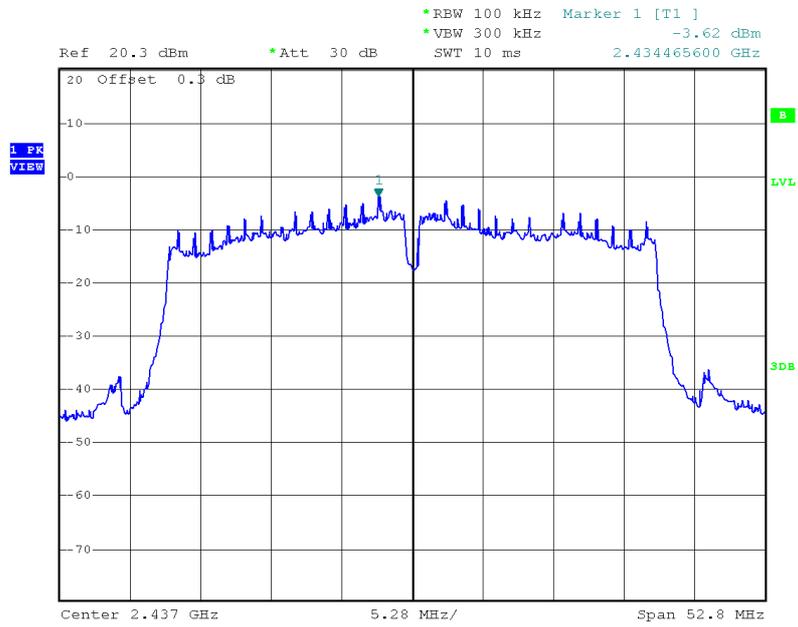
Channel 03 ANT 1



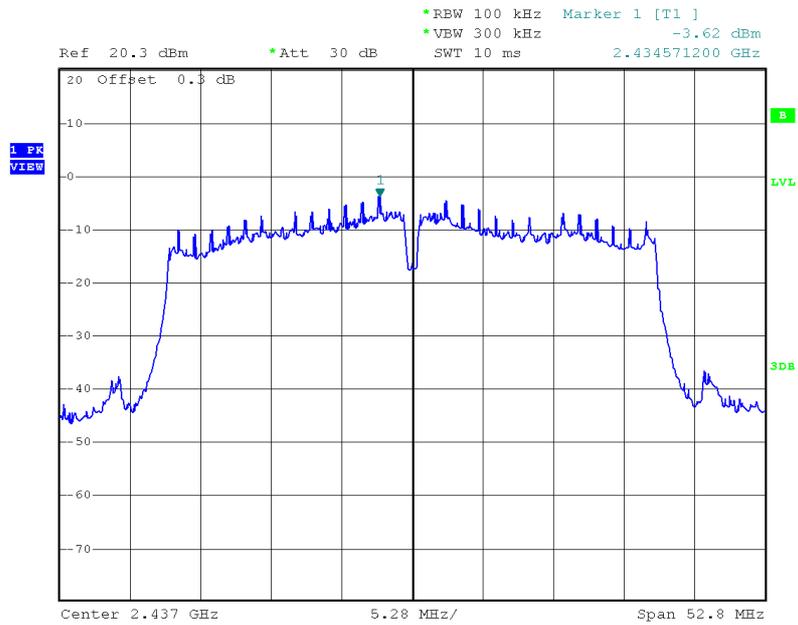
TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

Channel 06 ANT 0

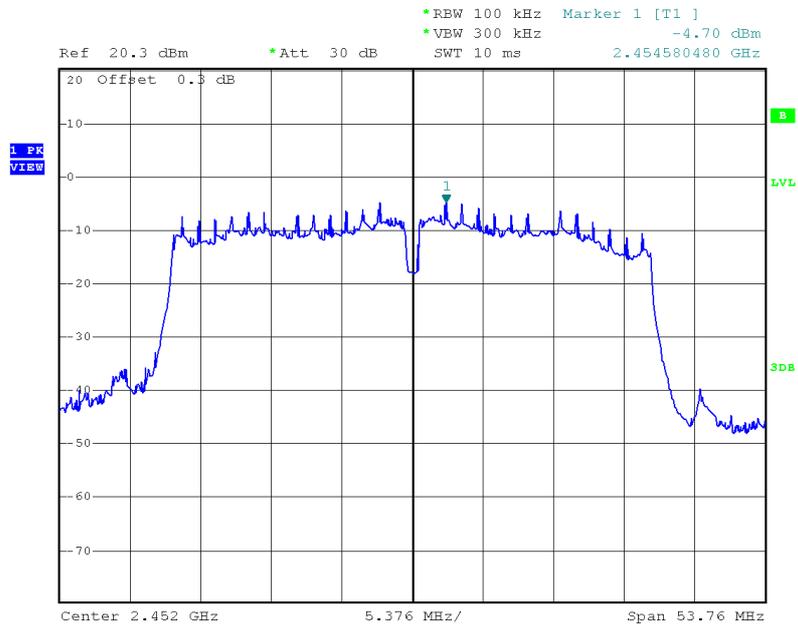


Channel 06 ANT 1

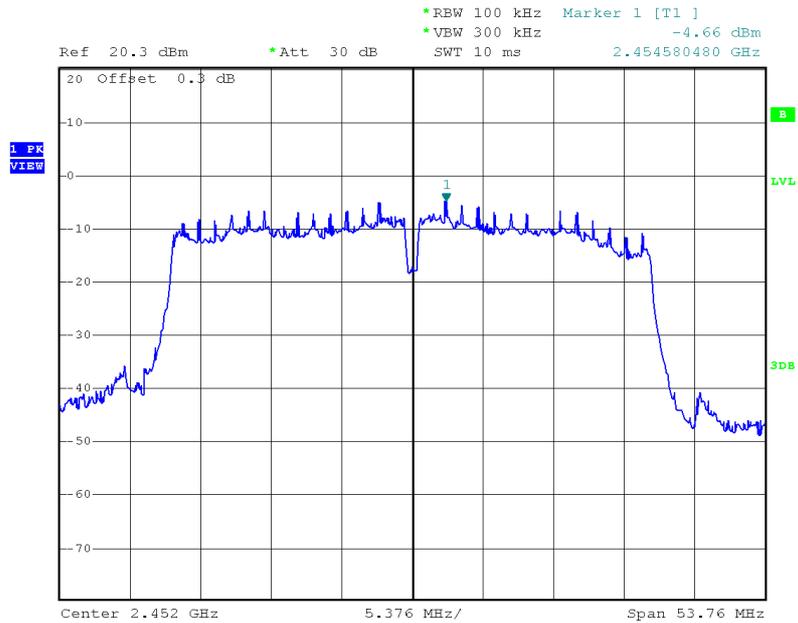


INTERTEK TESTING SERVICES

Channel 09 ANT 0



Channel 09 ANT 1



INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.
Model: AF23

Date of Test: 22 October 2012

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation. The Measurement Procedure was set according to the FCC KDB 558074.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Refer to the attached test plot for out of band conducted emissions data with rate of 1Mbps for 802.11b, 6Mbps for 802.11g, 13Mbps for 802.11n HT20 MIMO and 27Mbps for 802.11n HT40 MIMO. For MIMO system, both the antenna ports is checked and the worst case are shown, The worst case Out of Band Conducted Emissions is derived from the method of Measure according KDB662911.

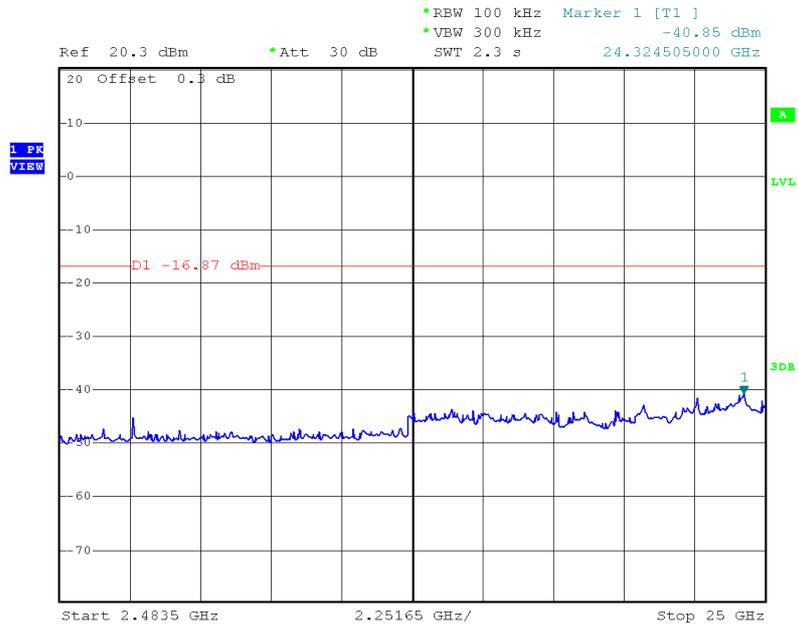
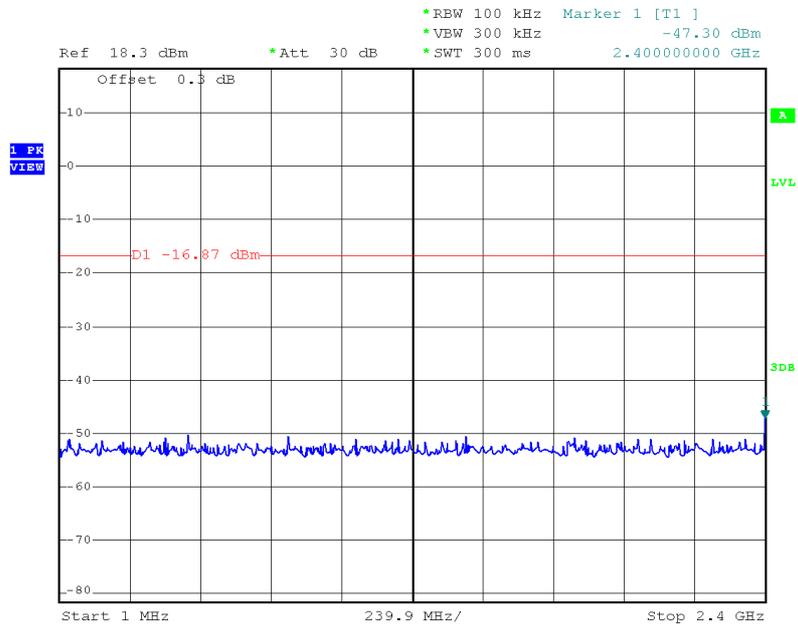
The test plots showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The test plots are attached as below.

INTERTEK TESTING SERVICES

802.11b

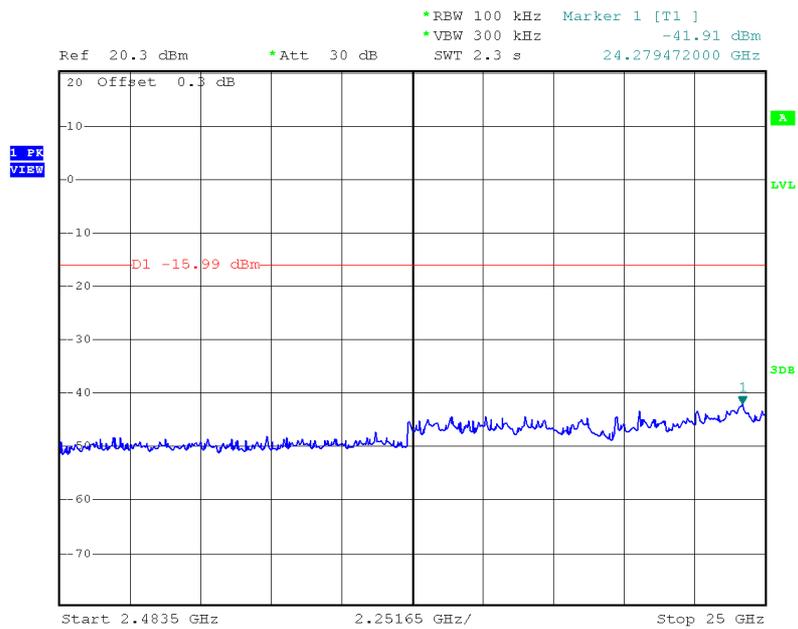
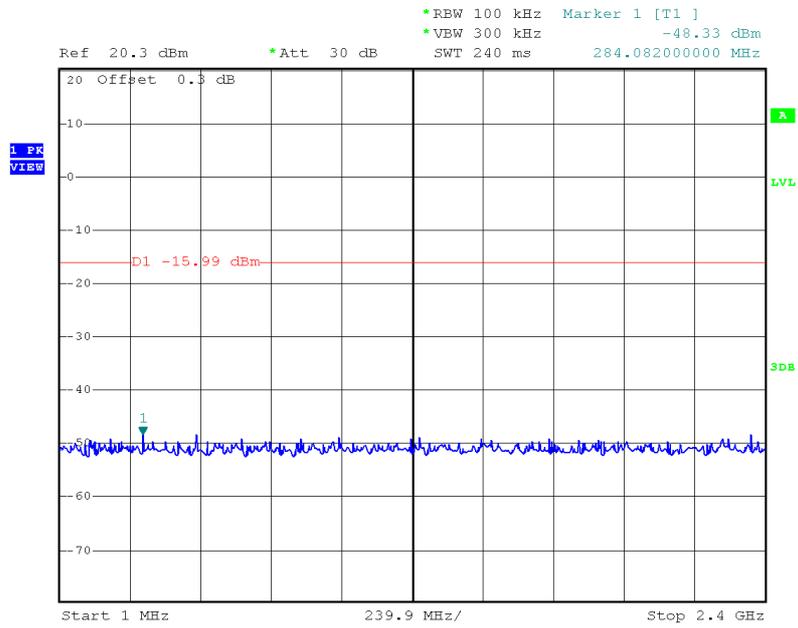
Channel 1 (2412MHz) Reference Level: 3.13dBm



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

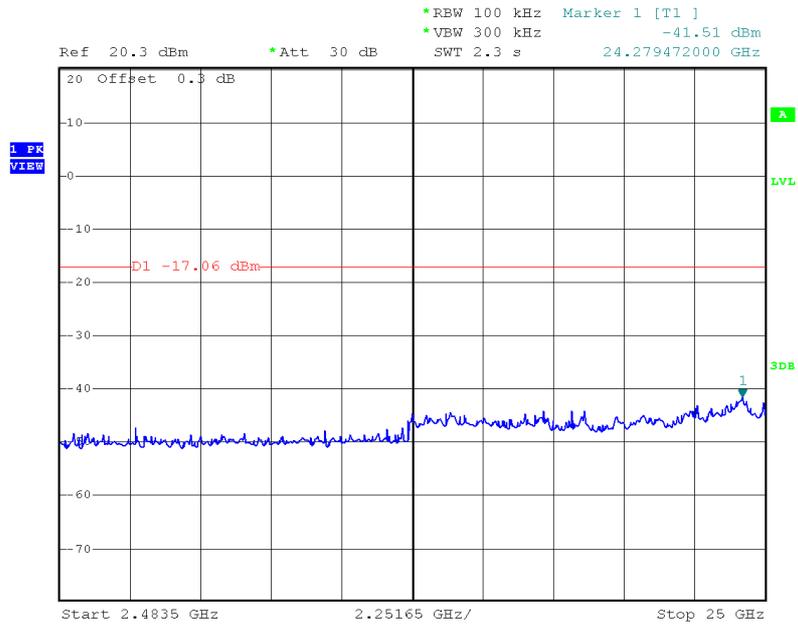
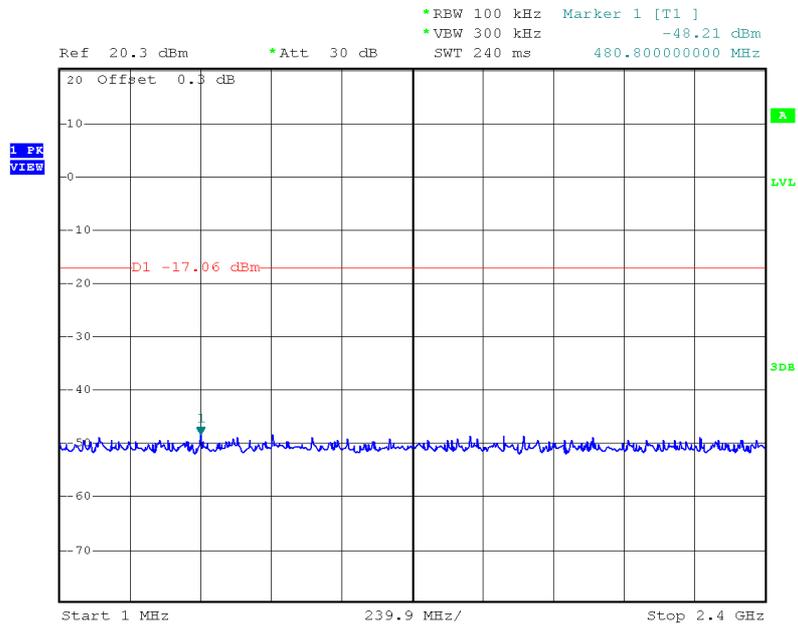
Channel 6 (2437MHz) Reference Level: 4.01dBm



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: 2.94dBm

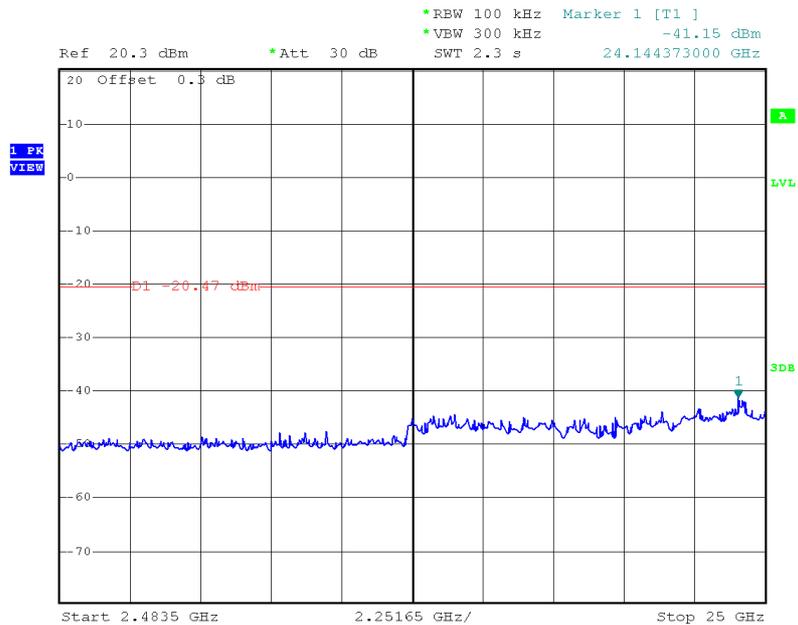
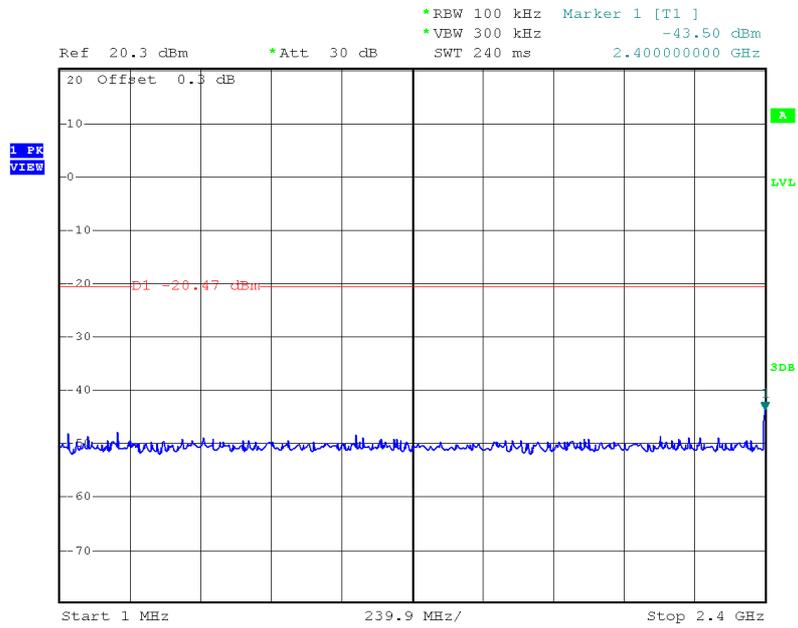


TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

802.11g

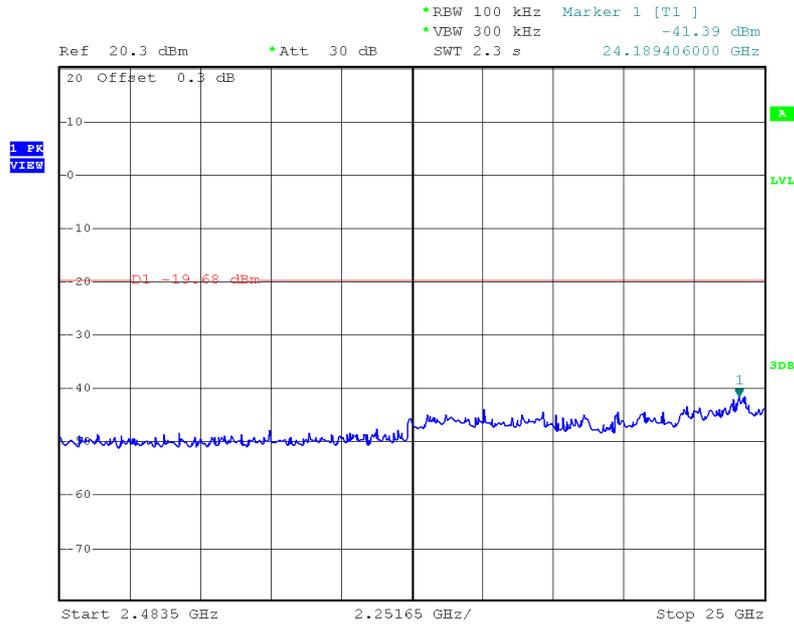
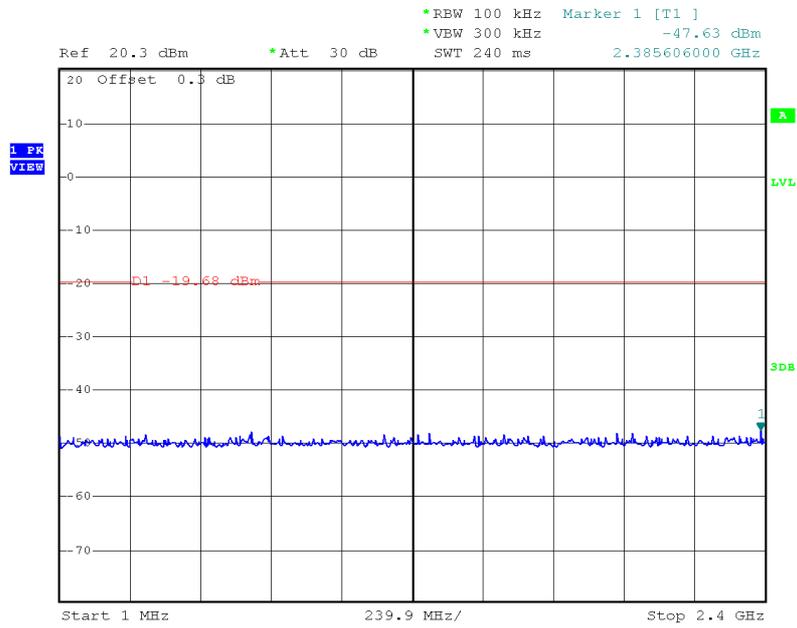
Channel 1 (2412MHz) Reference Level: -0.47dBm



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

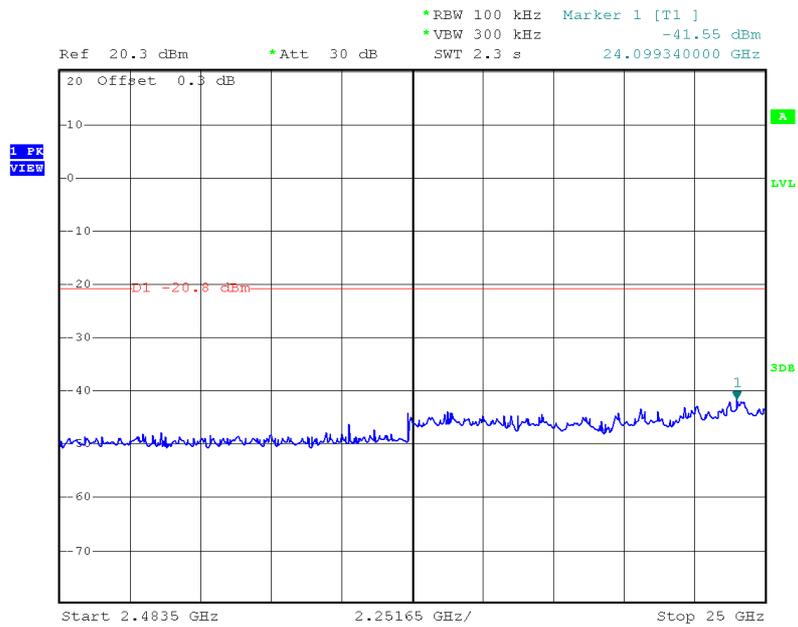
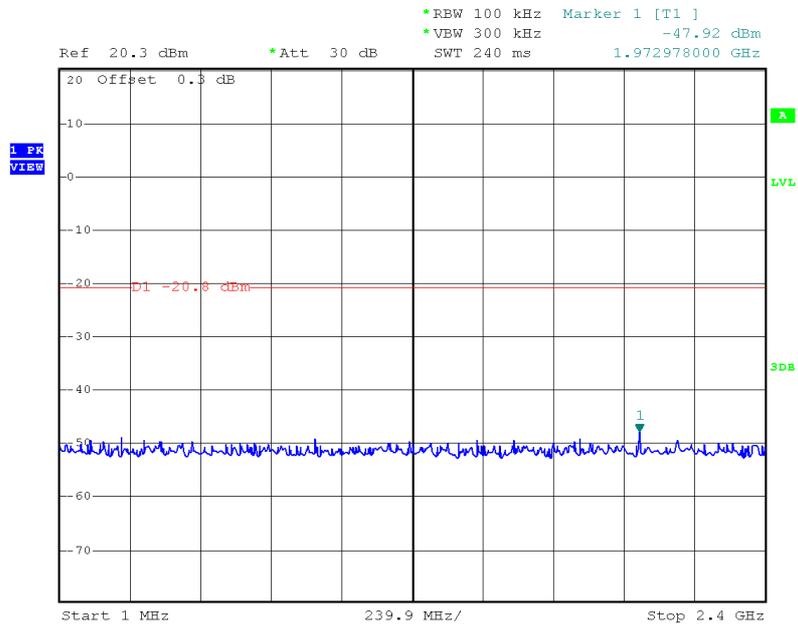
Channel 6 (2437MHz) Reference Level: 0.32dBm



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: -0.80dBm

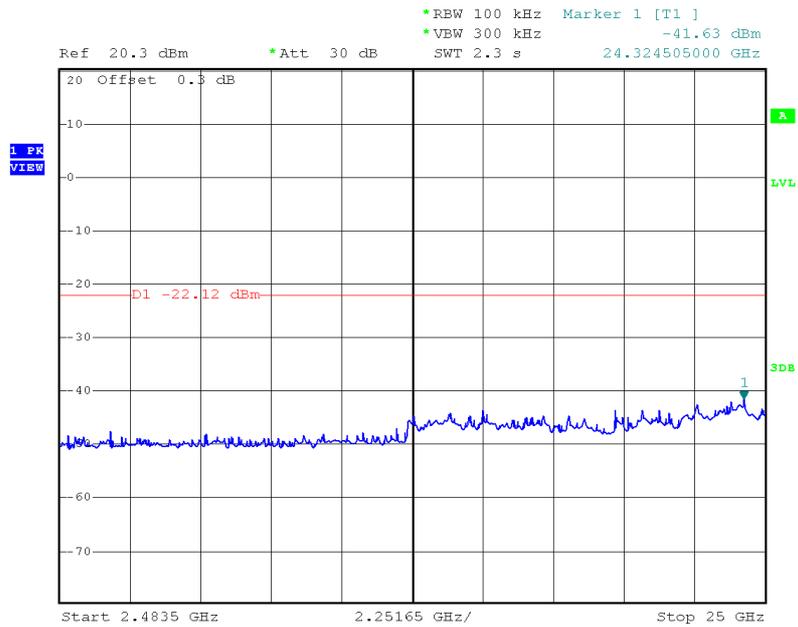
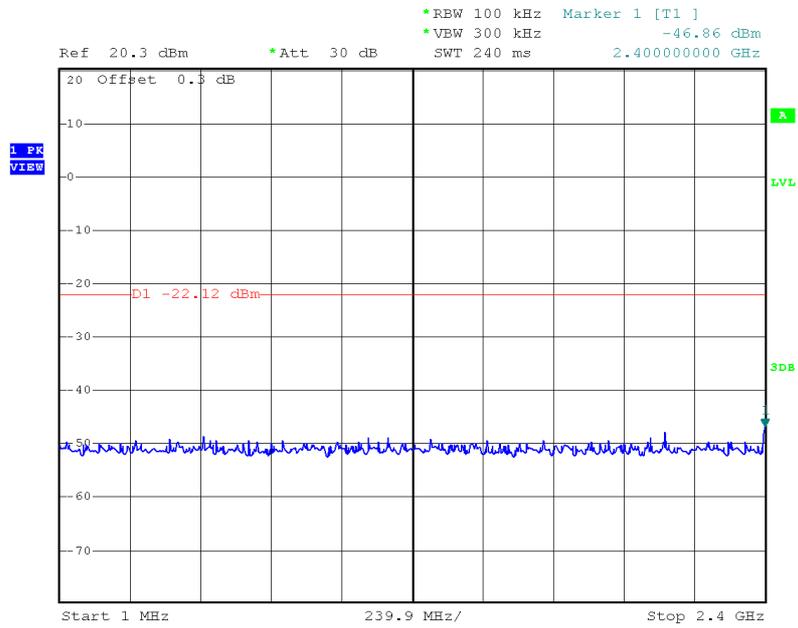


TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

802.11n (HT-20) MIMO

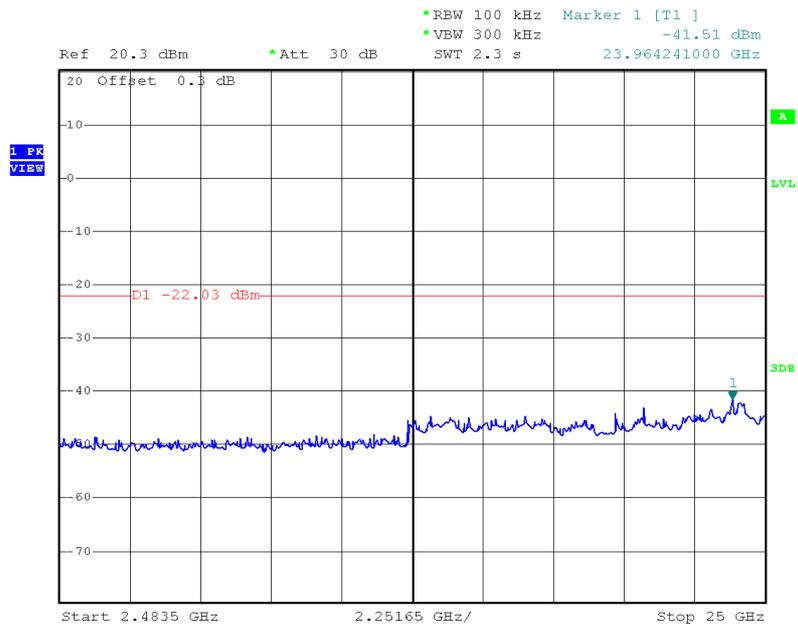
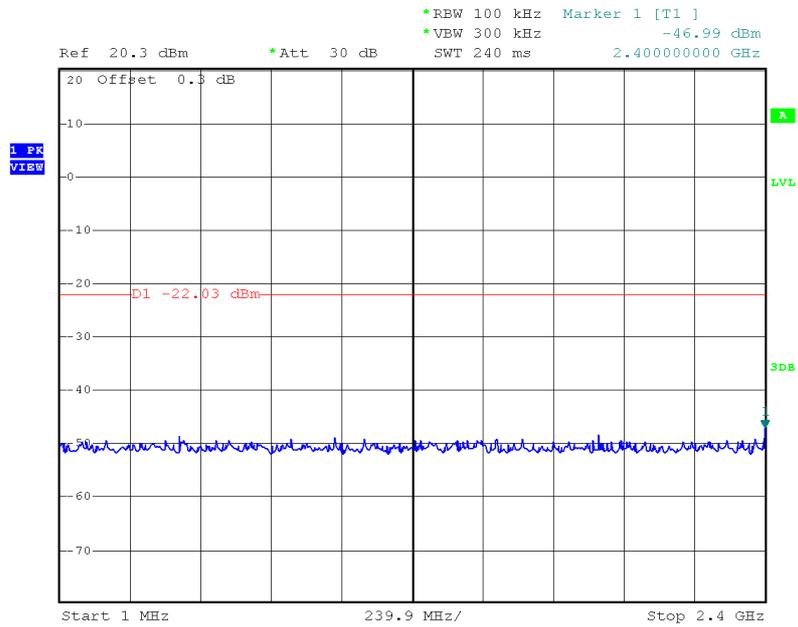
Channel 1 (2412MHz) Reference Level: -2.12dBm ANT 0



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

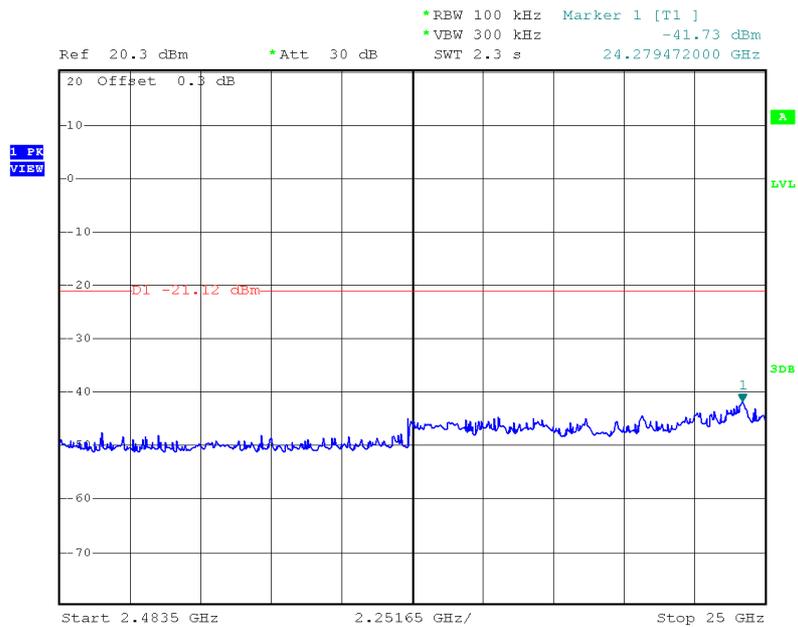
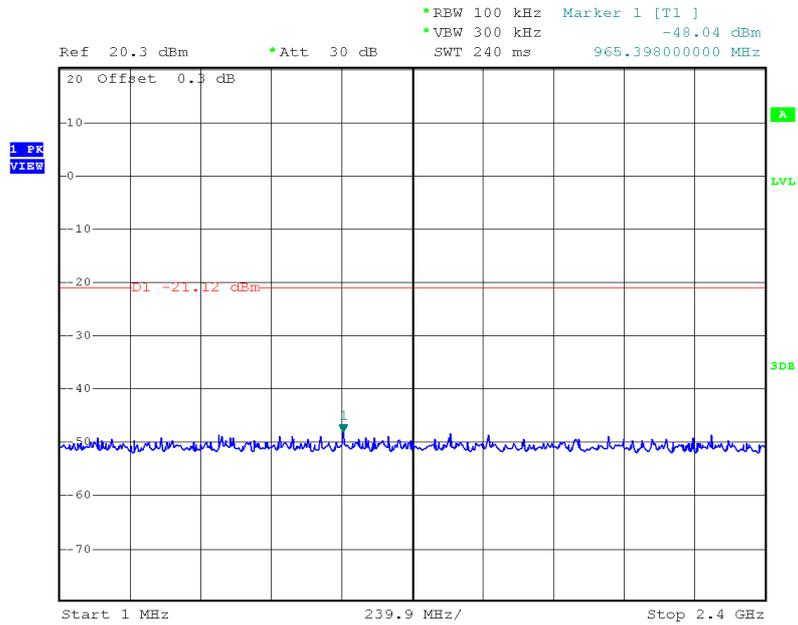
INTERTEK TESTING SERVICES

Channel 1 (2412MHz) Reference Level: -2.03dBm ANT 1



INTERTEK TESTING SERVICES

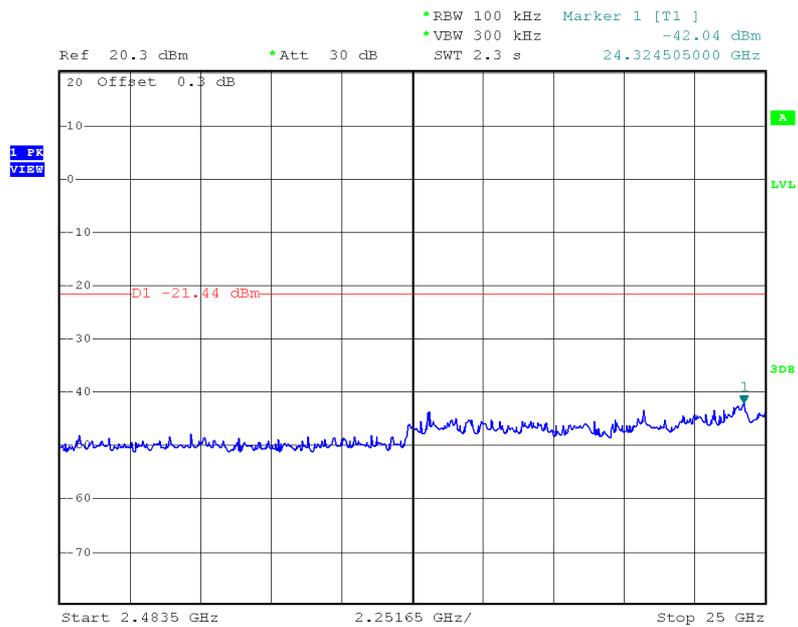
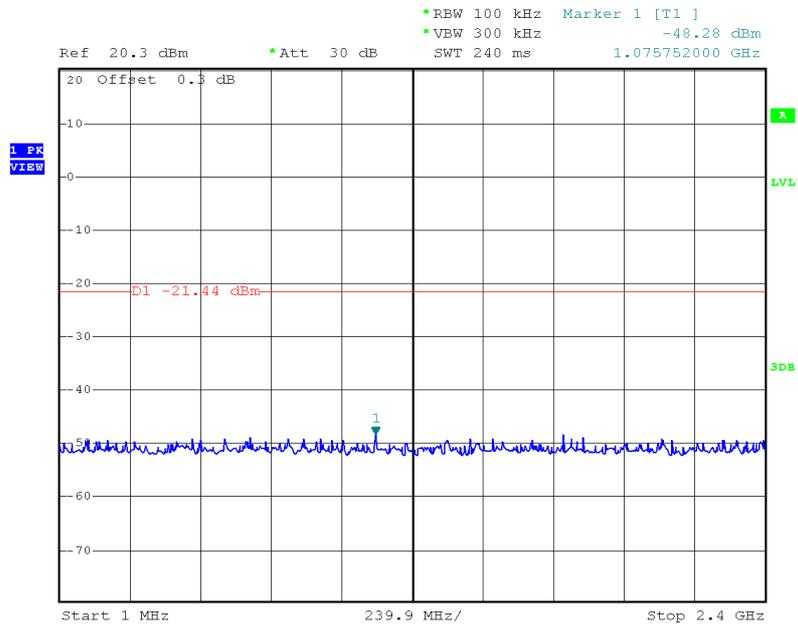
Channel 6 (2437MHz) Reference Level: -1.12dBm ANT 0



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

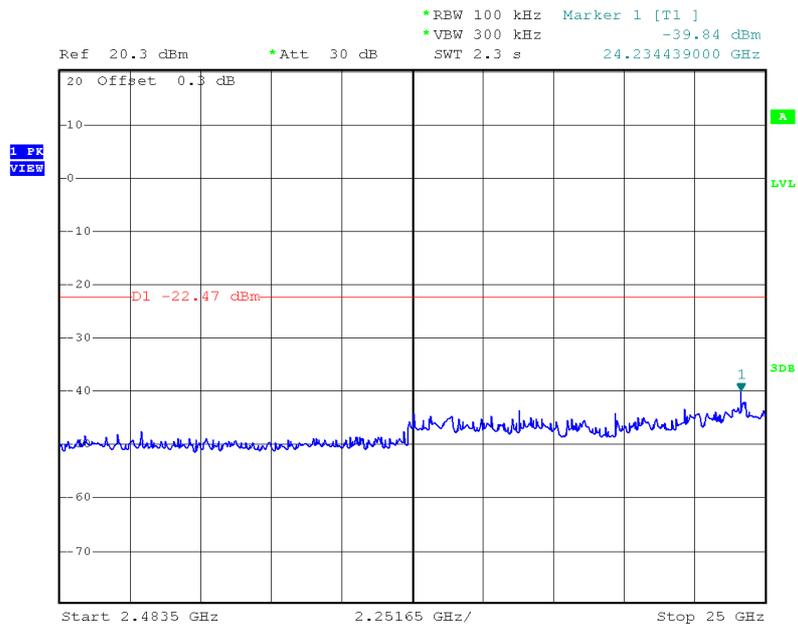
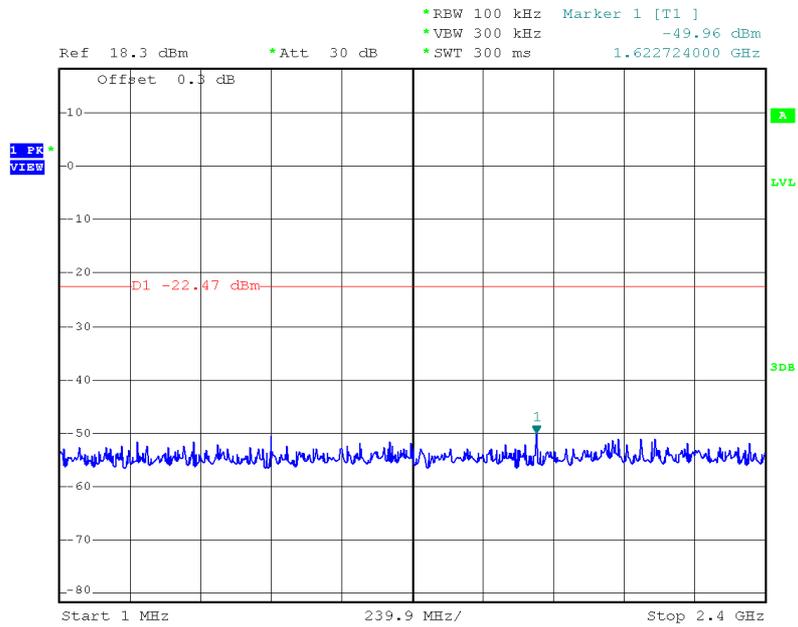
Channel 6 (2437MHz) Reference Level: -1.44dBm ANT 1



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

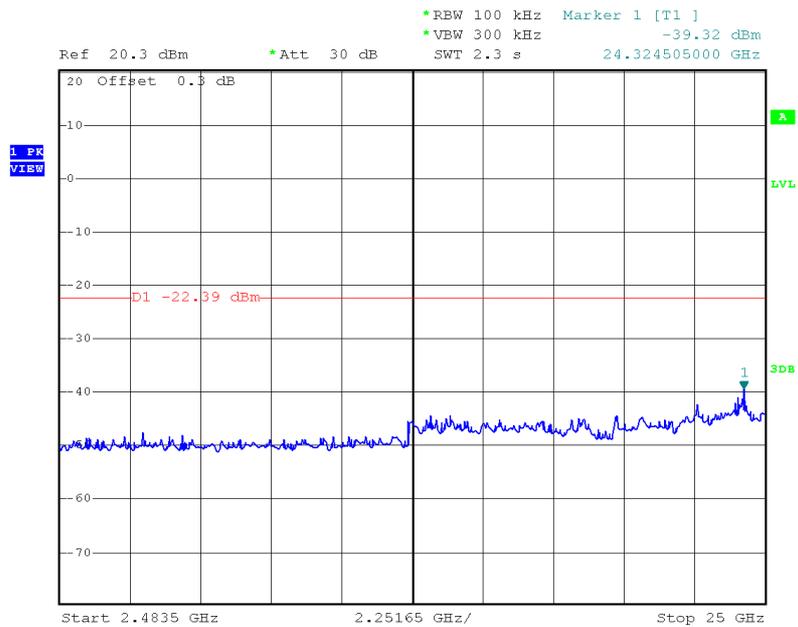
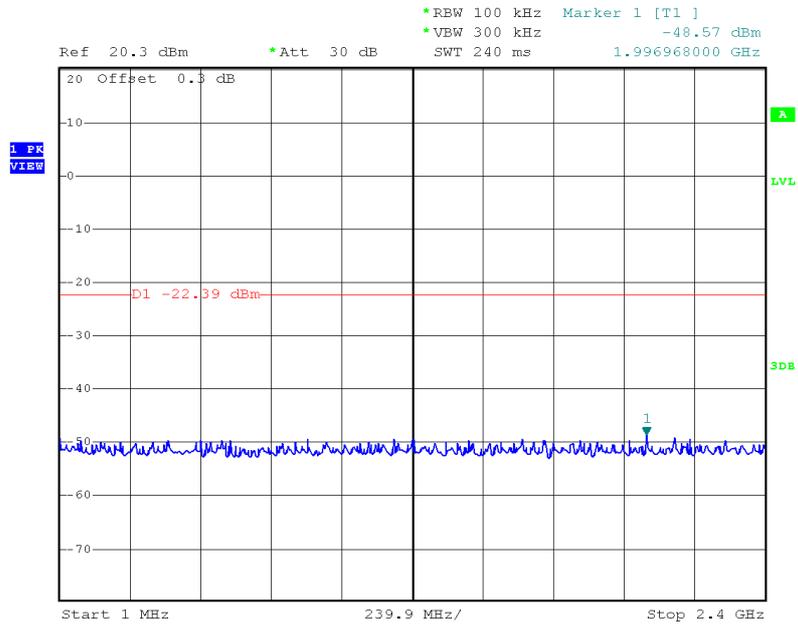
INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: -2.47dBm ANT 0



INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: -2.39dBm ANT 1

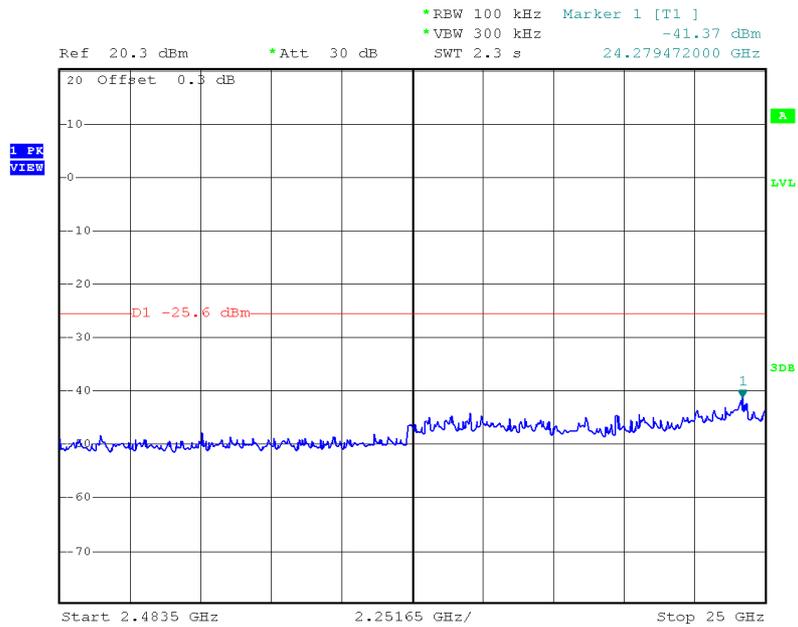
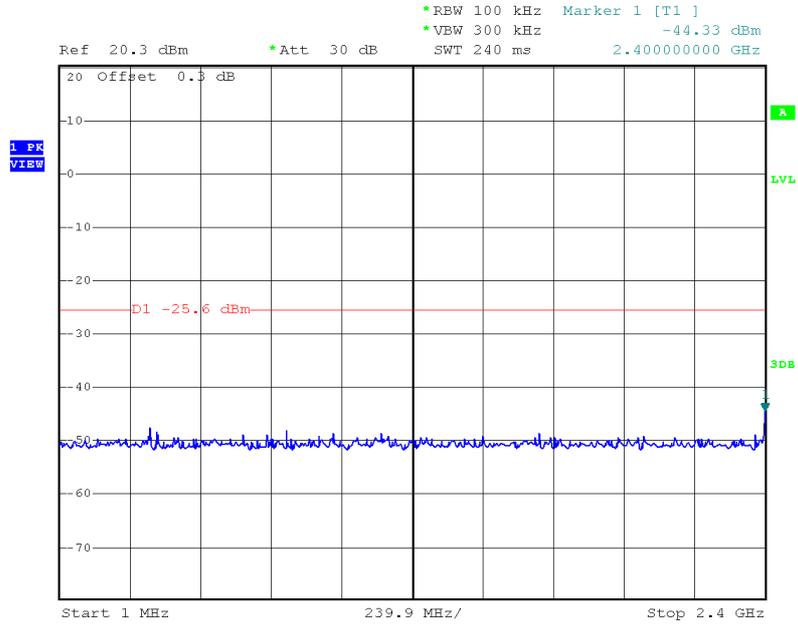


TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

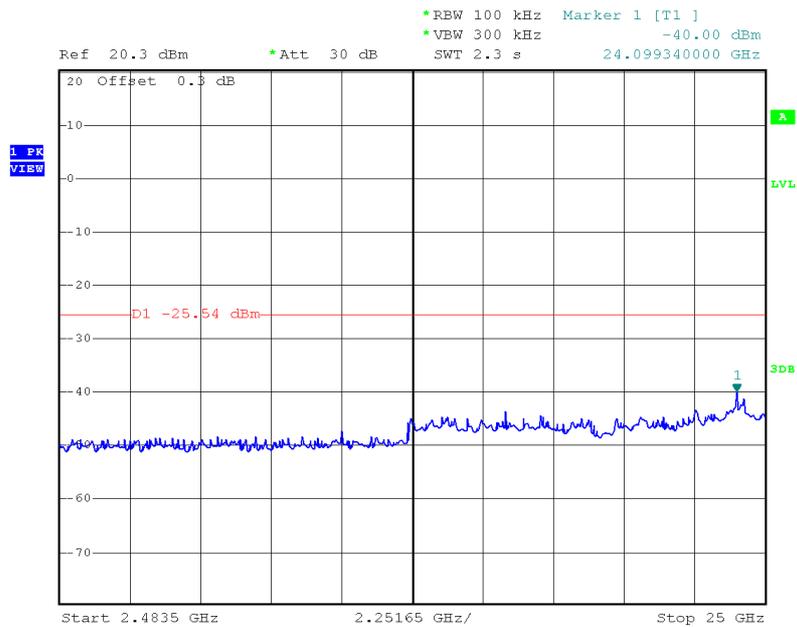
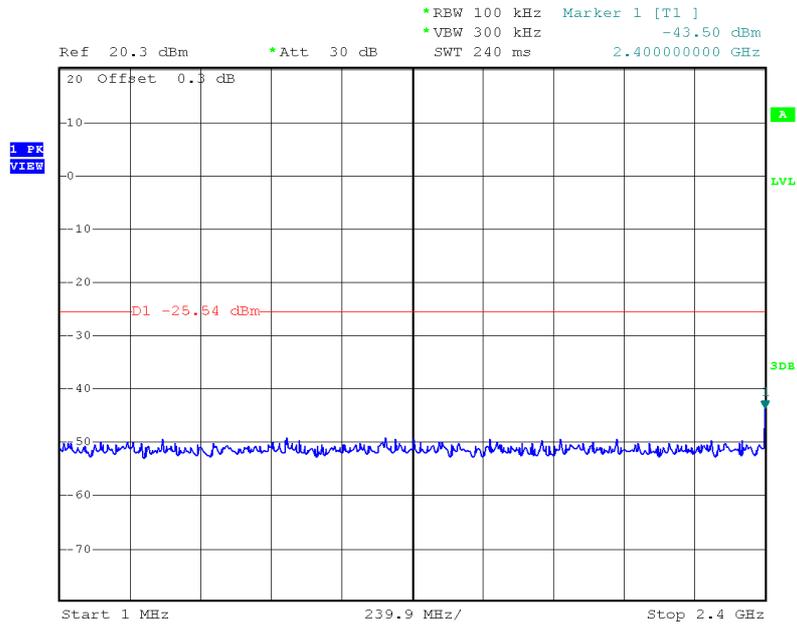
802.11n (HT-40) MIMO

Channel 3 (2422MHz) Reference Level: -5.60dBm ANT 0



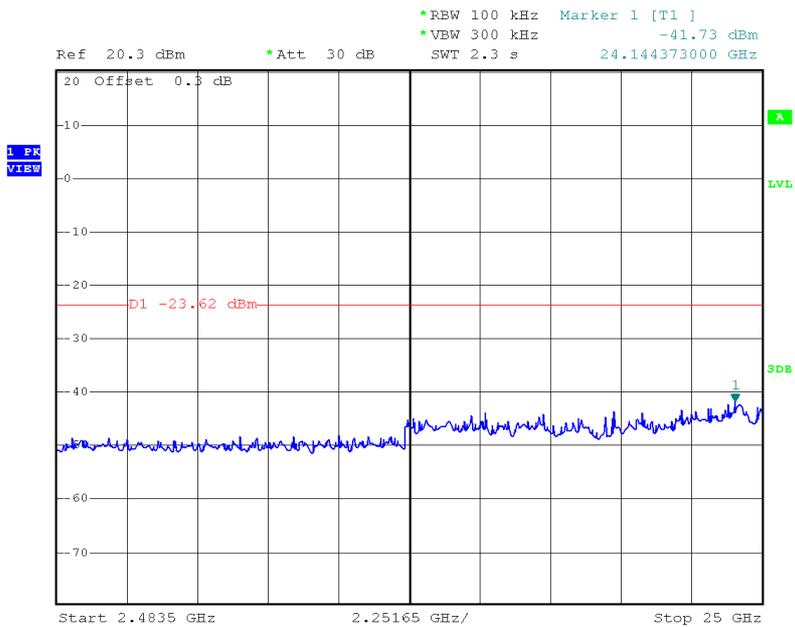
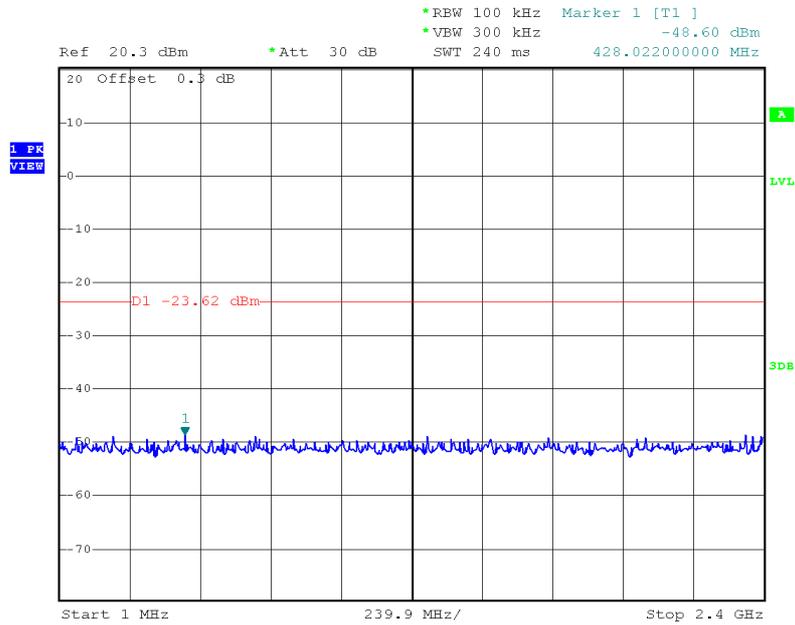
INTERTEK TESTING SERVICES

Channel 3 (2422MHz) Reference Level: -5.54dBm ANT 1



INTERTEK TESTING SERVICES

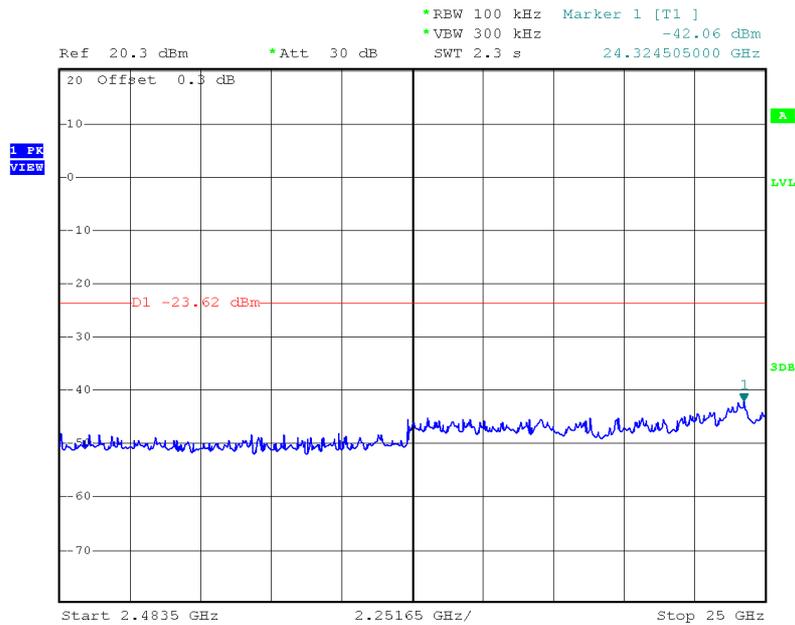
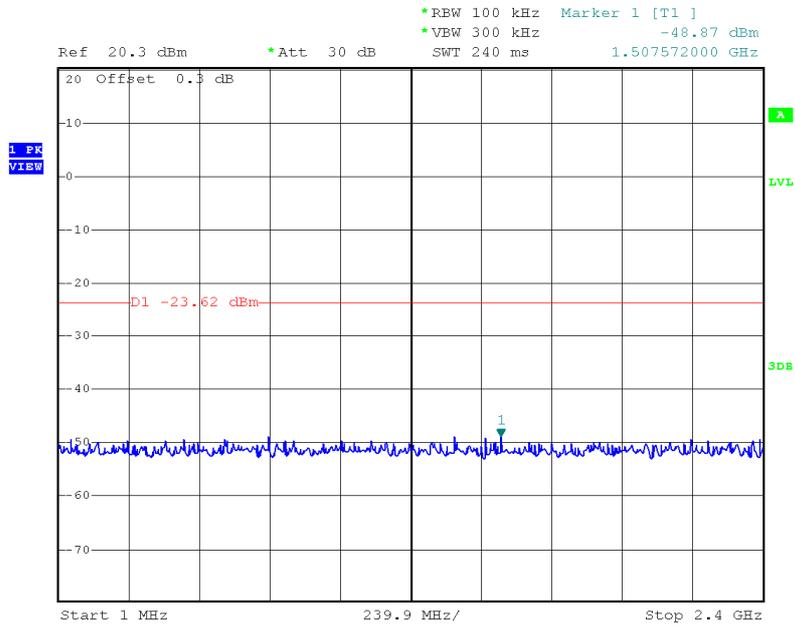
Channel 6 (2437MHz) Reference Level: -3.62dBm ANT 0



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

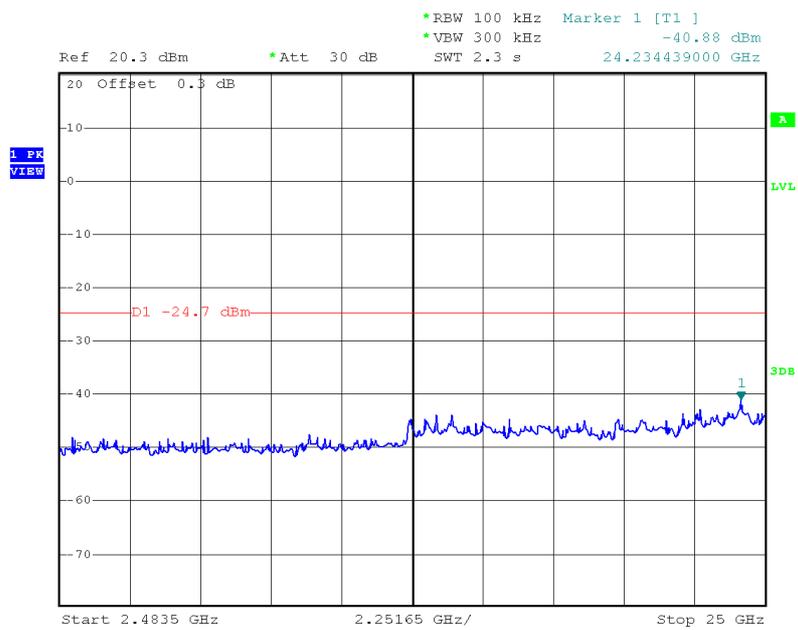
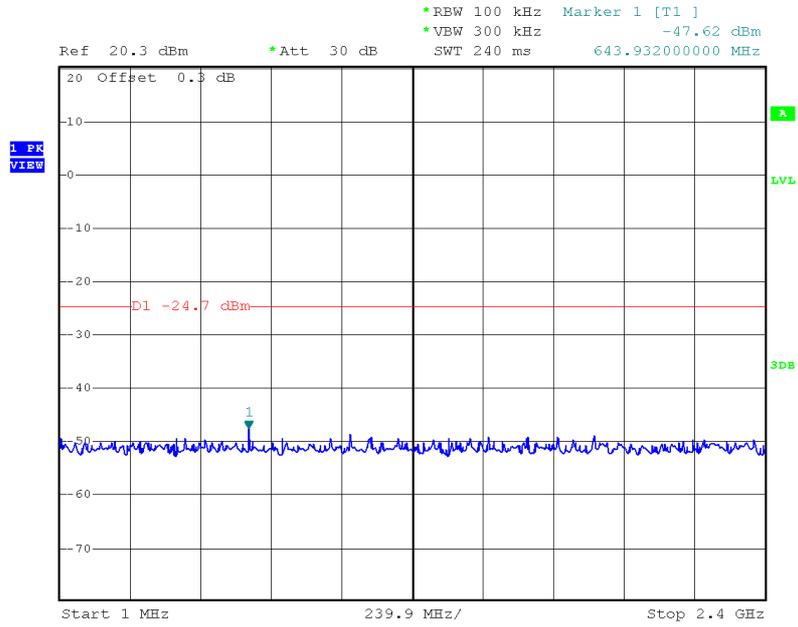
Channel 6 (2437MHz) Reference Level: -3.62dBm ANT 1



TRF no.: FCC 15C_TX_b
 FCC ID: QISAF23
 Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

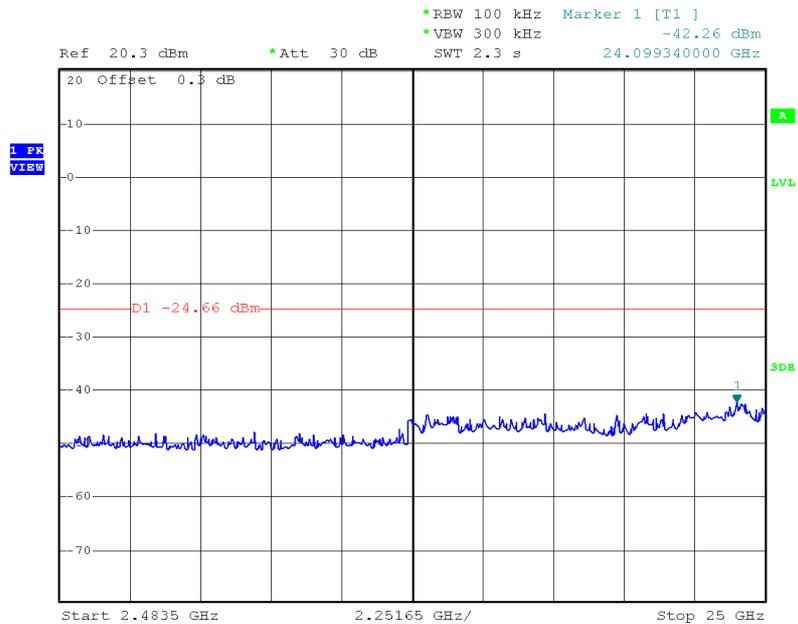
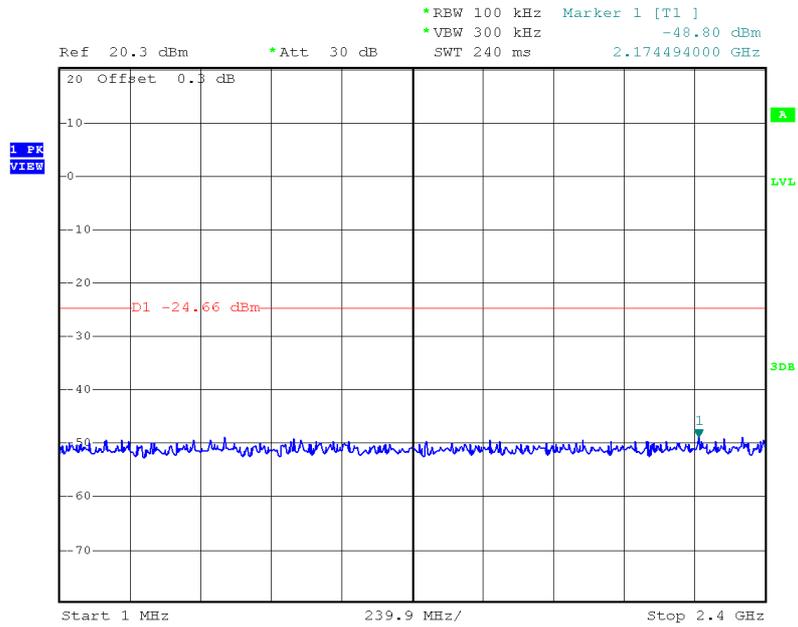
Channel 9 (2452MHz) Reference Level: -4.70dBm ANT 0



TRF no.: FCC 15C_TX_b
FCC ID: QISAF23
Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

Channel 9 (2452MHz) Reference Level: -4.66dBm ANT 1



INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
Model: AF23

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

- Not required, since all emissions are more than 20dB below fundamental
- See attached data sheet

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
Model: AF23

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b), (c):

Data is included of the 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. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
Model: AF23

4.7 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.

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

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

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:

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

Example

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

$$\begin{aligned} RA &= 62.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ PD &= 0 \text{ dB} \\ FS &= 62 + 7.4 + 1.6 - 29 + 0 = 42 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(42 \text{ dB}\mu\text{V/m})/20] = 125.9 \mu\text{V/m}$$

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
Model: AF23

4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission (802.11g) at 2483.550MHz is passed by 5.8 dB margin.

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

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012

Model: AF23

Worst Case Operating Mode: 802.11n HT20 MIMO (TX-Channel 06)

Radiated Emissions

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	30.485	24.2	20.0	18.6	22.8	40.0	-17.2
Horizontal	69.285	33.2	20.0	5.1	18.3	40.0	-21.7
Horizontal	145.254	36.5	20.0	8.4	24.9	43.5	-18.6
Vertical	42.125	36.7	20.0	11.7	28.4	40.0	-11.6
Vertical	55.968	43.9	20.0	6.7	30.6	40.0	-9.4
Vertical	68.315	42.9	20.0	5.2	28.1	40.0	-11.9

- NOTES:
1. Quasi-Peak detector is used except for others stated.
 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 are below the QP limit.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
 Model: AF23
 Mode: 802.11b (TX-Channel 01)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4824.000	51.1	36.1	34.1	49.1	74.0	-24.9
Horizontal	*2388.905	65.3	36.7	27.2	55.8	74.0	-18.2

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4824.000	40.2	36.1	34.1	38.2	54.0	-15.8
Horizontal	*2388.905	55.5	36.7	27.2	46.0	54.0	-8.0

- NOTES: 1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11b (TX-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	50.5	36.1	34.5	48.9	74.0	-25.1
Horizontal	*7311.000	51.7	35.6	37.1	53.2	74.0	-20.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	41.7	36.1	34.5	40.1	54.0	-13.9
Horizontal	*7311.000	39.4	35.6	37.1	40.9	54.0	-13.1

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
 Model: AF23
 Mode: 802.11b (TX-Channel 11)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	50.5	36.1	34.7	49.1	74.0	-24.9
Horizontal	*2483.520	53.6	36.7	27.7	44.6	74.0	-29.4

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	40.4	36.1	34.7	39.0	54.0	-15.0
Horizontal	*2483.520	43.6	36.7	27.7	34.6	54.0	-19.4

- NOTES: 1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11g (TX-Channel 01)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4824.000	50.2	36.1	34.1	48.2	74.0	-25.8
Horizontal	*2388.990	63.1	36.7	27.2	53.6	74.0	-20.4

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4824.000	41.8	36.1	34.1	39.8	54.0	-14.2
Horizontal	*2388.990	57.0	36.7	27.2	47.5	54.0	-6.5

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11g (TX-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	50.7	36.1	34.5	49.1	74.0	-24.9
Horizontal	*7311.000	51.6	35.6	37.1	53.1	74.0	-20.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	41.4	36.1	34.5	39.8	54.0	-14.2
Horizontal	*7311.000	38.7	35.6	37.1	40.2	54.0	-13.8

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11g (TX-Channel 11)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	49.7	36.1	34.7	48.3	74.0	-25.7
Horizontal	*7386.000	51.3	35.6	37.2	52.9	74.0	-21.1
Horizontal	*2483.550	64.5	36.7	27.7	55.5	74.0	-18.5

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	41.6	36.1	34.7	40.2	54.0	-13.8
Horizontal	*7386.000	39.6	35.6	37.2	41.2	54.0	-12.8
Horizontal	*2483.550	57.2	36.7	27.7	48.2	54.0	-5.8

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11n-20M (MIMO) (TX-Channel 01)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4824.000	54.3	36.1	34.1	52.3	74.0	-21.7
Horizontal	*2388.250	62.5	36.7	27.2	53.0	74.0	-21.0

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4824.000	44.1	36.1	34.1	42.1	54.0	-11.9
Horizontal	*2388.250	52.4	36.7	27.2	42.9	54.0	-11.1

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
 5. 11n-HT20 and 11n-HT20 (MIMO) are tested. Only the worst case data was reported.
- *
- Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11n-20M (MIMO) (TX-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	53.5	36.1	34.5	51.9	74.0	-22.1
Horizontal	*7311.000	51.3	35.6	37.1	52.8	74.0	-21.2

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	42.6	36.1	34.5	41.0	54.0	-13.0
Horizontal	*7311.000	39.7	35.6	37.1	41.2	54.0	-12.8

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
 5. 11n-HT20 and 11n-HT20 (MIMO) are tested. Only the worst case data was reported.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11n-20M (MIMO) (TX-Channel 11)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	52.2	36.1	34.7	50.8	74.0	-23.2
Horizontal	*7386.000	51.6	35.6	37.2	53.2	74.0	-20.8
Horizontal	*2483.580	59.0	36.7	27.7	50.0	74.0	-24.0

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4924.000	41.6	36.1	34.7	40.2	54.0	-13.8
Horizontal	*7386.000	40.2	35.6	37.2	41.8	54.0	-12.2
Horizontal	*2483.580	49.2	36.7	27.7	40.2	54.0	-13.8

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
 5. 11n-HT20 and 11n-HT20 (MIMO) are tested. Only the worst case data was reported.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11n-40M (MIMO) (TX-Channel 03)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4844.000	51.0	36.1	34.6	49.5	74.0	-24.5
Horizontal	*2389.500	64.8	36.7	27.2	55.3	74.0	-18.7

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4844.000	41.5	36.1	34.6	40.0	54.0	-14.0
Horizontal	*2389.500	55.0	36.7	27.2	45.5	54.0	-8.5

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
 5. 11n-HT40 and 11n-HT40 (MIMO) are tested. Only the worst case data was reported.
- *
- Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 22 October 2012

Model: AF23

Mode: 802.11n-40M (MIMO) (TX-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	50.5	36.1	34.8	49.2	74.0	-24.8
Horizontal	*7311.000	51.4	35.6	37.3	53.1	74.0	-20.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4874.000	41.4	36.1	34.8	40.1	54.0	-13.9
Horizontal	*7311.000	40.1	35.6	37.3	41.8	54.0	-12.2

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
 5. 11n-HT40 and 11n-HT40 (MIMO) are tested. Only the worst case data was reported.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
 Model: AF23
 Mode: 802.11n-40M (MIMO) (TX-Channel 9)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4904.000	49.5	36.1	34.8	48.2	74.0	-25.8
Horizontal	*7356.000	49.4	35.6	37.4	51.2	74.0	-22.8
Horizontal	*2483.600	63.5	36.7	27.7	54.5	74.0	-19.5

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	*4904.000	41.4	36.1	34.8	40.1	54.0	-13.9
Horizontal	*7356.000	41.2	35.6	37.4	43.0	54.0	-11.0
Horizontal	*2483.600	48.9	36.7	27.7	39.9	54.0	-14.1

- NOTES: 1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance 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 radiated 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. Horn antenna used for the emission over 1000MHz.
5. 11n-HT40 and 11n-HT40 (MIMO) are tested. Only the worst case data was reported.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

INTERTEK TESTING SERVICES

4.9 Conducted Emission

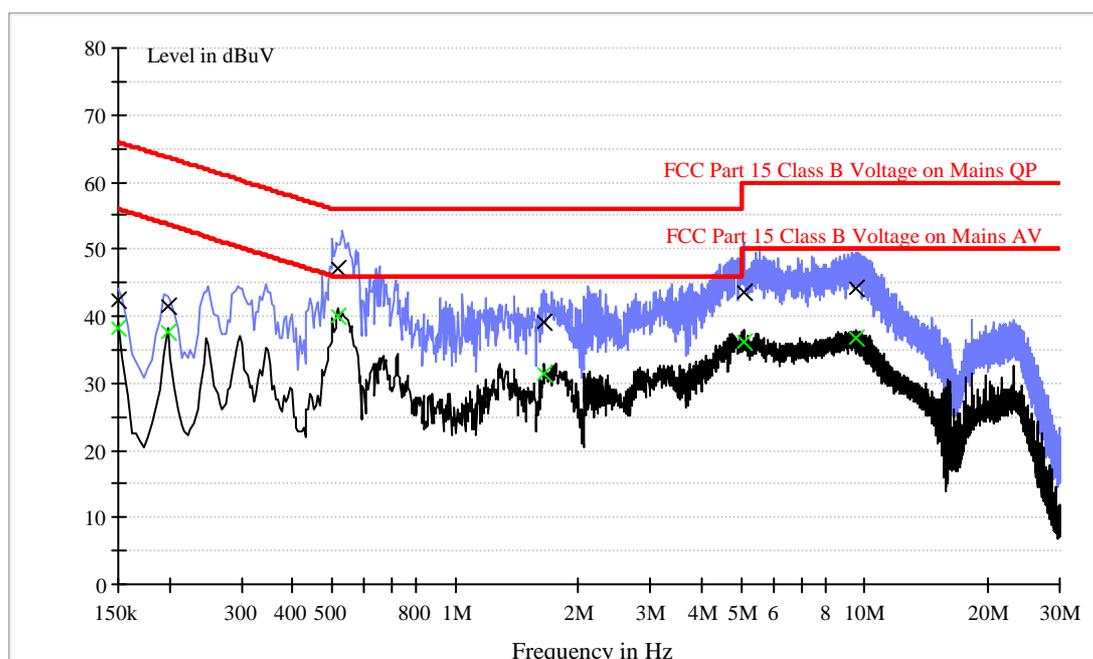
Worst Case Live-Conducted emission at 0.518MHz is Passed by 6.1 dB margin

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

INTERTEK TESTING SERVICES

Company: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
 Model: AF23
 Worst Case Operating Mode: (802.11n-HT40 MIMO 2422MHz)

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150	42.3	L1	9.6	23.7	66.0
0.198	41.5	L1	9.6	22.2	63.7
0.518	47.2	L1	9.6	8.8	56.0
1.654	39.0	L1	9.7	17.0	56.0
5.058	43.5	L1	9.8	16.5	60.0
9.514	44.2	L1	9.9	15.8	60.0

Result Table AV

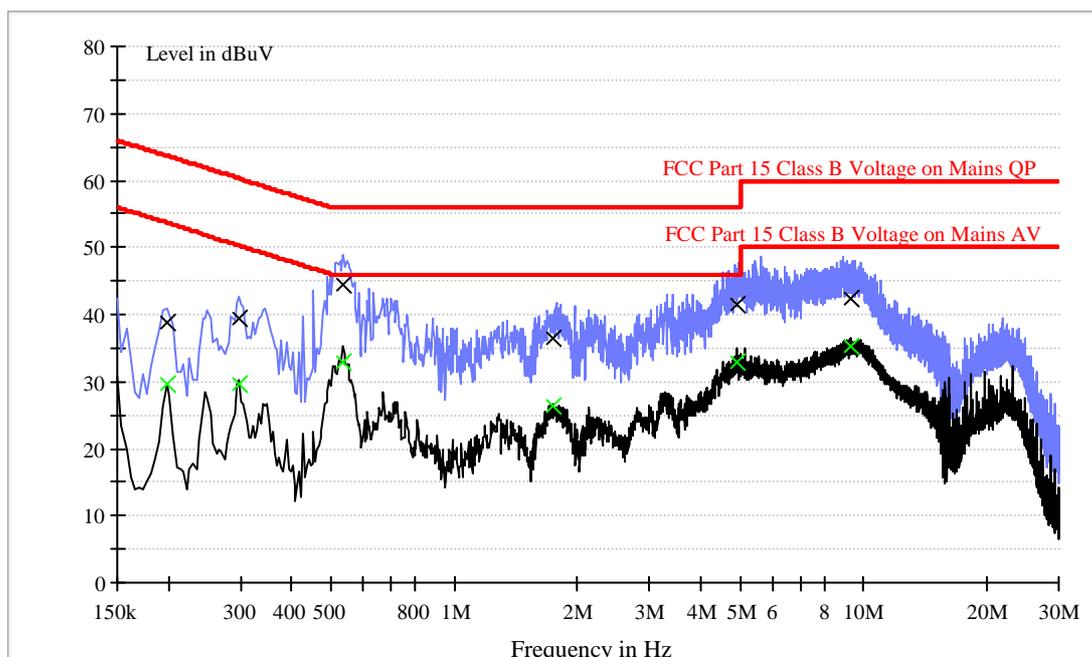
Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150	38.3	L1	9.6	17.7	56.0
0.198	37.8	L1	9.6	15.9	53.7
0.518	39.9	L1	9.6	6.1	46.0
1.654	31.4	L1	9.7	14.6	46.0
5.058	36.1	L1	9.8	13.9	50.0
9.514	36.6	L1	9.9	13.4	50.0

TRF no.: FCC 15C_TX_b
 FCC ID: QISAF23
 Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

Company: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
 Model: AF23
 Worst Case Operating Mode: Transmit (802.11n-HT40 MIMO 2422MHz)

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.198	38.9	N	9.6	24.8	63.7
0.298	39.4	N	9.6	20.9	60.3
0.534	44.3	N	9.6	11.7	56.0
1.750	36.3	N	9.8	19.7	56.0
4.922	41.3	N	9.9	14.7	56.0
9.306	42.4	N	10.0	17.6	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.198	29.6	N	9.6	24.1	53.7
0.298	29.7	N	9.6	20.6	50.3
0.534	33.0	N	9.6	13.0	46.0
1.750	26.3	N	9.8	19.7	46.0
4.922	32.9	N	9.9	13.1	46.0
9.306	35.1	N	10.0	14.9	50.0

TRF no.: FCC 15C_TX_b
 FCC ID: QISAF23
 Report No.: SZ12090056-1

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 22 October 2012
Model: AF23

4.10 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

- Not required - No digital part
- Test results are attached
- Included in the separated report.

INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.
Model: AF23

Date of Test: 22 October 2012

4.11 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

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EXHIBIT 5

EQUIPMENT PHOTOGRAPHS

INTERTEK TESTING SERVICES

5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.doc & internal photos.pdf.

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EXHIBIT 6

PRODUCT LABELLING

INTERTEK TESTING SERVICES

6.0 Product Labelling

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

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EXHIBIT 7

TECHNICAL SPECIFICATIONS

INTERTEK TESTING SERVICES

7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

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EXHIBIT 8

INSTRUCTION MANUAL

INTERTEK TESTING SERVICES

8.0 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 9

MISCELLANEOUS INFORMATION

INTERTEK TESTING SERVICES

9.0 **Discussion of Pulse Desensitization**

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

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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	30-Jun-12	30-Jun-13
SZ185-01	EMI Receiver	R&S	ESCI	100547	11-Mar-12	11-Mar-13
SZ061-09	Horn Antenna	ETS	3115	00092346	29-Oct-11	29-Oct-12
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	11-Mar-12	11-Mar-13
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	11-Mar-12	11-Mar-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	11-Mar-12	11-Mar-13
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	03-Mar-12	03-Mar-13
SZ062-02	RF Cable	RADIALL	RG 213U	--	17-Mar-12	17-Sep-13
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	--	01-Nov-11	01-Nov-12
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	14-Jul-12	14-Jan-13
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	11-Jun-12	11-Jun-13
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	05-Nov-11	05-Nov-12
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	05-Nov-11	05-Nov-12
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	05-Nov-11	05-Nov-12
SZ188-03	Shielding Room	ETS	RFD-100	4100	10-Sep-12	10-Sep-13