



Antenna International

Application
For
Certification

FCC ID: A5E-XPIRIS2

MID

Model: XP IRIS2
Brand Name: Antenna International™

2.4GHz Transceiver

Report No.: 140102026SZN-008

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 [10-1-13]

Prepared and Checked by:

Approved by:

Sign on file

Sen Lv
Project Engineer

Billy Li
Supervisor
Date: March 11, 2014

- 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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- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

TRF No.: FCC 15C_TX_b

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INTERTEK TESTING SERVICES

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 Labelling
<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

Antenna International
Model: XP IRIS2

FCC ID: A5E-XPIRIS2

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

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

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 [10-1-13 Edition] provision.

Report prepared by:

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Table of Contents

1.0 General Description	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 System Test Configuration	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 Emission Results	7
3.1 Radiated Test Results	8
3.1.1 Field Strength Calculation	8
3.1.2 Radiated Emission Configuration Photograph	9
3.1.3 Radiated Emissions	9
3.1.4 Transmitter Spurious Emissions (Radiated)	12
3.2 Conducted Emission at Mains Terminal	16
3.2.1 Conducted Emissions Configuration Photograph	16
3.2.2 Conducted Emissions	16
4.0 Equipment Photographs	20
5.0 Product Labelling	22
6.0 Technical Specifications	24
7.0 Instruction Manual	26
8.0 Miscellaneous Information	28
8.1 20dB BW Plot	29
8.2 Discussion of Pulse Desensitization	30
8.3 Emissions Test Procedures	31
9.0 Confidentiality Request	34
10.0 Test Equipment List	36

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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
Test Report	20dB BW Plot	bw.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
Cover Letter	Confidentiality Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf

EXHIBIT 1

GENERAL DESCRIPTION

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1.0 General Description

1.1 Product Description

The equipment under test (EUT) is a MID, it includes Bluetooth (4.0, single mode) function operating in 2402-2480 MHz and WIFI function. The EUT was powered by a 3.7 VDC Li-ion rechargeable battery which can be charged by AC/DC adapter. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna
Modulation Type: GFSK

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

1.2 Related Submittal(s) Grants

1. This is an application for certification of the Bluetooth (4.0) Function operating at 2402-2480MHz.
2. WIFI Function: Refer to report 140102026SZN-009
3. Other digital function: Refer to report 140102026SZN-007.

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. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

1.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are **Intertek Testing 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

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2.0 System Test Configuration

2.1 Justification

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

The EUT was powered by a fully charged 3.7 VDC Li-ion rechargeable battery which is charged by a charging dock with DC 5V output and the charging dock is powered by an AC/DC adapter with AC 120V, 60Hz input during the test.

The EUT has only BLE mode and it is 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. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.

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

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

2.2 EUT Exercising Software

The EUT engineering mode (provided by client) used during testing as similar to a typical use.

2.3 Special Accessories

N/A

2.4 Equipment Modification

Any modifications installed previous to testing by Antenna International 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.

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2.5 Measurement Uncertainty

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

2.6 Support Equipment List and Description

Description	Manufacturer	Model No.
Headphone	Antenna International (will be marketed in one package with the MID)	N/A
Charging Unit (with USB Cable, unshielded, 90cm)	Antenna International	Output: 5V
USB Power Adapter	Tp-Link	T050100-2A3 Input: AC 100-240V; 50/60Hz Output: DC 5V; 1A

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 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

3.1.1 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. A sample calculation is included below.

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

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

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:

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

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 net field strength for comparison to the appropriate emission limit is 42 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 62.0 dB μ V
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
FS = 62 + 7.4 + 1.6 - 29 = 42 dB μ V/m

Level in μ V/m = Common Antilogarithm [(42 dB μ V/m)/20] = 125.9 μ V/m

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3.1.2 Radiated Emission Configuration Photograph

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

3.1.3 Radiated Emissions

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.

Worst Case Radiated Emission
at
31.788 MHz

Judgement: Passed by 5.2 dB

TEST PERSONNEL:

Sign on file

Sen Lv, Project Engineer
Typed/Printed Name

January 18, 2014
Date

INTERTEK TESTING SERVICES

Applicant: Antenna International

Model: XP IRIS2

Sample: 1/1

Worst Case Operating Mode: Transmit with charging

Table 1

Radiated Emissions

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	31.440	35.9	20.0	6.1	22.0	40.0	-18.0
Horizontal	161.920	43.5	20.0	10.3	33.8	43.5	-9.7
Horizontal	270.075	40.6	20.0	13.9	34.5	46.0	-11.5
Vertical	31.788	45.0	20.0	9.8	34.8	40.0	-5.2
Vertical	39.700	47.0	20.0	6.8	33.8	40.0	-6.2
Vertical	191.990	33.0	20.0	16.3	29.3	43.5	-14.2

- 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.

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3.1.4 Transmitter Spurious Emissions (Radiated)

Worst Case Radiated Emission
at
2483.500 MHz

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

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 5.0 dB

TEST PERSONNEL:

Sign on file

Sen Lv, Project Engineer
Typed/Printed Name

January 18, 2014
Date

INTERTEK TESTING SERVICES

Applicant: Antenna International
Model: XP IRIS2
Sample: 1/1
Worst Case Operating Mode: Transmit with charging

Table 2

Radiated Emissions

(2402MHz)

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	2402.000	107.5	36.7	28.5	99.3	114.0	-14.7
Horizontal	4804.000	49.6	36.7	35.0	47.9	74.0	-26.1
Horizontal	7206.000	48.3	36.1	37.0	49.2	74.0	-24.8
Horizontal	9608.000	54.8	36.2	37.5	56.1	74.0	-17.9
Horizontal	2390.000	67.3	36.7	28.5	59.1	74.0	-14.9
Horizontal	2399.542	68.0	36.7	28.5	59.8	74.0	-14.2

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	2402.000	95.7	36.7	28.5	87.5	94.0	-6.5
Horizontal	4804.000	34.6	36.7	35.0	32.9	54.0	-21.1
Horizontal	7206.000	34.8	36.1	37.0	35.7	54.0	-18.3
Horizontal	9608.000	39.9	36.2	37.5	41.2	54.0	-12.8
Horizontal	2390.000	54.9	36.7	28.5	46.7	54.0	-7.3
Horizontal	2399.542	55.1	36.7	28.5	46.9	54.0	-7.1

- Notes: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meter. Harmonic 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 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. Horn antenna is used for the emission over 1000MHz.

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Applicant: Antenna International

Model: XP IRIS2

Sample: 1/1

Worst Case Operating Mode: Transmit with charging

Table 3

Radiated Emissions

(2440MHz)

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	2440.000	105.9	36.7	28.5	97.7	114.0	-16.3
Horizontal	4880.000	50.1	36.7	35.0	48.4	74.0	-25.6
Horizontal	7320.000	49.2	36.1	37.0	50.1	74.0	-23.9
Horizontal	9760.000	53.6	36.2	38.0	55.4	74.0	-18.6

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	2440.000	95.0	36.7	28.5	86.8	94.0	-7.2
Horizontal	4880.000	35.1	36.7	35.0	33.4	54.0	-20.6
Horizontal	7320.000	35.1	36.1	37.0	36.0	54.0	-18.0
Horizontal	9760.000	38.1	36.2	38.0	39.9	54.0	-14.1

- Notes:
1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
 2. All measurements were made at 3 meter. Harmonic 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 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. Horn antenna is used for the emission over 1000MHz.

TRF No.: FCC 15C_TX_b

FCC ID: A5E-XPIRIS2

Report No.: 140102026SZN-008

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Applicant: Antenna International
Model: XP IRIS2
Sample: 1/1
Worst Case Operating Mode: Transmit with charging

Table 4

Radiated Emissions

(2480MHz)

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	2480.000	106.8	36.7	28.3	98.4	114.0	-15.6
Horizontal	4960.000	48.2	36.7	35.3	46.8	74.0	-27.2
Horizontal	7440.000	48.6	36.1	37.0	49.5	74.0	-24.5
Horizontal	9920.000	53.8	36.3	38.7	56.2	74.0	-17.8
Horizontal	2483.500	67.8	36.7	28.3	59.4	74.0	-14.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	2480.000	93.6	36.7	28.3	85.2	94.0	-8.8
Horizontal	4960.000	32.6	36.7	35.3	31.2	54.0	-22.8
Horizontal	7440.000	35.0	36.1	37.0	35.9	54.0	-18.1
Horizontal	9920.000	38.6	36.3	38.7	41.0	54.0	-13.0
Horizontal	2483.500	57.4	36.7	28.3	49.0	54.0	-5.0

- Notes: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
2. All measurements were made at 3 meter. Harmonic 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 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. Horn antenna is used for the emission over 1000MHz.

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3.2 Conducted Emission at Mains Terminal

3.2.1 Conducted Emissions Configuration Photograph

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

3.2.2 Conducted Emissions

Worst Case -Conducted Configuration
At

3.002 MHz

Judgement: Passed by 10.7 dB margin

TEST PERSONNEL:

Sign on file

Sen Lv, Project Engineer
Typed/Printed Name

January 20, 2014
Date

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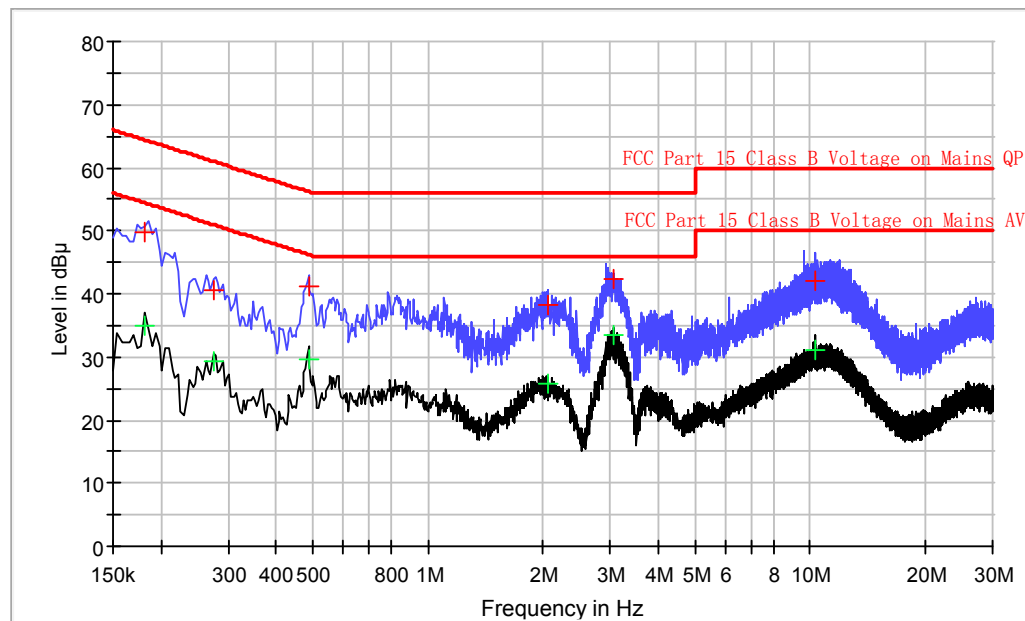
Applicant: Antenna International

Model: XP IRIS2

Sample: 1/1

Worst Case Operating Mode: Transmit with charging

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.182000	49.7	L1	9.8	14.7	64.4
0.274000	40.5	L1	9.7	20.5	61.0
0.486000	41.2	L1	9.7	15.0	56.2
2.066000	38.2	L1	9.9	17.8	56.0
3.046000	42.3	L1	9.8	13.7	56.0
10.270000	42.0	L1	10.0	18.0	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.182000	35.0	L1	9.8	19.4	54.4
0.274000	29.3	L1	9.7	21.7	51.0
0.486000	29.7	L1	9.7	16.5	46.2
2.066000	25.7	L1	9.9	20.3	46.0
3.046000	33.6	L1	9.8	12.4	46.0
10.270000	31.0	L1	10.0	19.0	50.0

TRF No.: FCC 15C_TX_b

FCC ID: A5E-XPIRIS2

Report No.: 140102026SZN-008

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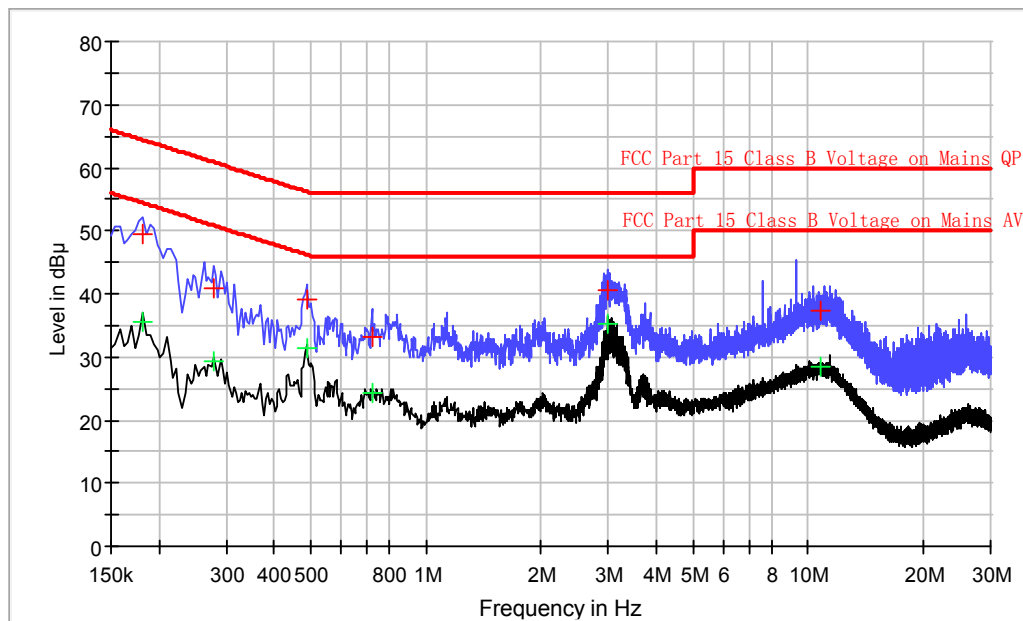
Applicant: Antenna International

Model: XP IRIS2

Sample: 1/1

Worst Case Operating Mode: Transmit with charging

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.182000	49.6	N	10.2	14.8	64.4
0.278000	40.8	N	10.2	20.1	60.9
0.486000	39.0	N	10.2	17.2	56.2
0.722000	33.3	N	10.3	22.7	56.0
3.002000	40.6	N	10.3	15.4	56.0
10.814000	37.3	N	10.5	22.7	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.182000	35.4	N	10.2	19.0	54.4
0.278000	29.4	N	10.2	21.5	50.9
0.486000	31.3	N	10.2	14.9	46.2
0.722000	24.3	N	10.3	21.7	46.0
3.002000	35.3	N	10.3	10.7	46.0
10.814000	28.4	N	10.5	21.6	50.0

TRF No.: FCC 15C_TX_b

FCC ID: A5E-XPIRIS2

Report No.: 140102026SZN-008

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EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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4.0 Equipment Photographs

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

EXHIBIT 5
PRODUCT LABELLING

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5.0 **Product Labelling**

For electronic 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 and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

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 details of the measured bandedge, the test procedure and calculation of factor such as pulse desensitization.

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8.1 20dB BW Plot

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

Figure 8.1 Bandwidth

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8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device.

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8.3 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

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

The transmitting 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 EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode and average mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings.

The frequency range scanned is from 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 40 GHz, whichever is lower.

Detector function for conducted emissions is in QP & AV mode and IFBW setting is 9 kHz from the frequency band 150 kHz to 30MHz.

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8.3 Emissions Test Procedures (cont'd)

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

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

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

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

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EXHIBIT 9

CONFIDENTIALITY REQUEST

INTERTEK TESTING SERVICES

9.0 Confidentiality Request

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

EXHIBIT 10
TEST EQUIPMENT LIST

INTERTEK TESTING SERVICES

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
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	27-Aug-13	27-Aug-14
SZ061-08	Horn Antenna	ETS	3115	00092346	26-Oct-13	26-Oct-14
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	13-May-13	13-May-14
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	RADIAL	RG 213U	--	29-Jun-13	29-Jun-14
SZ062-06	RF Cable	RADIAL	0.04-26.5GHz	--	20-Jul-13	20-Jul-14
SZ062-12	RF Cable	RADIAL	0.04-26.5GHz	--	17-Oct-13	17-Apr-14
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	17-Oct-13	17-Apr-14
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	20-Jul-13	20-Jul-14
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	9-Nov-13	9-Nov-14
SZ188-03	Shielding Room	ETS	RFD-100	4100	9-Nov-13	9-Nov-14