

SwatchMate Pty.Ltd.

Application
For
Certification

FCC ID: 2ACYDS001**CUBE****Model: S001****2.4GHz Transceiver****Report No.: 140728028SZN-001**

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 [10-01-13]

Prepared and Checked by:

Sign on file

Robert Li
Project Engineer

Approved by:

Andy Yan
Senior Project Engineer
Date: 27 October 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.
- This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results referenced from this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
- 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

Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch
6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China

Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751 Website: www.china.intertek-etalsemko.com

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>	<i>Confidentiality Request</i>
<i>EXHIBIT 10:</i>	Test Equipment List

INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

SwatchMate Pty.Ltd. - MODEL: S001

FCC ID: 2ACYDS001

This report concerns (check one :) Original Grant 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

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 [10-01-13 Edition] provision.

Report prepared by:

Robert Li
Intertek Testing Services Shenzhen Ltd.
Kejiyuan Branch
6F, Block D, Huahan Building, Langshan Road,
Nanshan District, Shenzhen, P. R. China
Phone: (86 755) 8614 0635
Fax: (86 755) 8601 6751

INTERTEK TESTING SERVICES

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)	11
3.2 Conducted Emission at Mains Terminal	15
3.2.1 Conducted Emissions Configuration Photograph	15
3.2.2 Conducted Emissions	15
4.0 Equipment Photographs	19
5.0 Product Labelling	21
6.0 Technical Specifications	23
7.0 Instruction Manual	25
8.0 Miscellaneous Information	27
8.1 Bandedge Plot	28
8.2 Discussion of Pulse Desensitization	30
8.3 Transmitter Duty Cycle Calculation	31
8.4 Emissions Test Procedures	32
9.0 Confidentiality Request	34
10.0 Test Equipment List	36

INTERTEK TESTING SERVICES

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	Bandedge Plot	bandedge.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	Letter of Agency	agency.pdf
Cover Letter	Request for Permanent Confidentiality	request.pdf
Cover Letter	Certification request	agreement.pdf

INTERTEK TESTING SERVICES

EXHIBIT 1

GENERAL DESCRIPTION

INTERTEK TESTING SERVICES

1.0 General Description

1.1 Product Description

The equipment under test (EUT) is a CUBE. The EUT can be powered by DC3.7V fully charged lithium battery which was charged by PC USB port or AC/DC adapter. For more detailed information please refer to the user manual.

Bluetooth Version: Bluetooth 4.0 single mode

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

This is an application for certification of a transceiver for the CUBE, and there is no corresponding unit for certification.

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

INTERTEK TESTING SERVICES

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 DC3.7V fully charged lithium battery which was charged by PC USB port or AC/DC adapter (PC or AC/DC adapter with input: 120V/60Hz) during the testing, only the worst data was reported in this report.

All packets in modulation type GFSK were tested, and only the worst data was reported in this report.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. 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 exercise program (provided by client) used during testing was designed to exercise the various system components in a manner similar to a typical use.

2.3 Special Accessories

N/A

2.4 Equipment Modification

Any modifications installed previous to testing by SwatchMate Pty.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.

INTERTEK TESTING SERVICES

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.
iPod	Apple	A1421
Adapter	TP-Link	T050100-2A3 Input: AC 100-240V, 50/60Hz, 0.3A Output: DC 5V, 1A
USB Cable	SwatchMate Pty.Ltd.	Unshielded, Length:1.0m
Laptop	Lenovo	T420

EXHIBIT 3

EMISSION RESULTS

INTERTEK TESTING SERVICES

3.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

INTERTEK TESTING SERVICES

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, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

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

Where

FS = Field Strength in dB μ V/m

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

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

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

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

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, and the resultant average factor was -10 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.

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

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

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

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

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

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

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

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

INTERTEK TESTING SERVICES

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
101.28 MHz

Judgement: Passed by 6.9 dB

TEST PERSONNEL:

Sign on file

Robert Li, Project Engineer
Typed/Printed Name

27 October 2014
Date

INTERTEK TESTING SERVICES

Applicant: SwatchMate Pty.Ltd.

Date of Test: 27 October 2014

Model: S001

Sample: 1/1

Worst Case Operating Mode: BT Link with Adapter charging

Table 1

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	31.440	27.1	20.0	17.6	24.7	40.0	-15.3
Horizontal	101.280	48.0	20.0	8.6	36.6	43.5	-6.9
Horizontal	441.780	36.4	20.0	16.9	33.3	46.0	-12.7
Vertical	31.440	26.7	20.0	17.6	24.3	40.0	-15.7
Vertical	59.100	42.5	20.0	6.9	29.4	40.0	-10.6
Vertical	102.240	41.6	20.0	8.5	30.1	43.5	-13.4

- 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

3.1.4 Transmitter Emissions (Radiated)

Worst Case Radiated Emission
at
7206.000 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 7.6 dB

TEST PERSONNEL:

Sign on file

Robert Li, Project Engineer
Typed/Printed Name

27 October 2014

Date

INTERTEK TESTING SERVICES

Applicant: SwatchMate Pty.Ltd.

Date of Test: 27 October 2014

Model: S001

Sample: 1/1

Worst Case Operating Mode: Transmit

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	101.3	36.7	28.5	93.1	114.0	-20.9
Horizontal	4804.000	56.5	36.7	28.5	48.3	74.0	-25.7
Horizontal	7206.000	50.5	36.1	33.1	47.5	74.0	-26.5
Horizontal	9608.000	41.6	36.2	37.8	43.2	74.0	-30.8

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	2402.000	90.7	36.7	28.5	82.5	94.0	-11.5
Horizontal	4804.000	53.8	36.7	28.5	45.6	54.0	-8.4
Horizontal	7206.000	49.4	36.1	33.1	46.4	54.0	-7.6
Horizontal	9608.000	40.7	36.2	37.8	42.3	54.0	-11.7

Notes: 1. Peak Detector Data unless otherwise stated. RBW=1MHz and VBW=3MHz for peak test value, RBW=1MHz and VBW=10Hz for average test value, RBW 3MHz for fundamental emission.

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.

Test Engineer: Robert Li

TRF No.: FCC 15C_TX_b
FCC ID: 2ACYDS001

INTERTEK TESTING SERVICES

Applicant: SwatchMate Pty.Ltd.

Date of Test: 27 October 2014

Model: S001

Sample: 1/1

Worst Case Operating Mode: Transmit

Table 3

Radiated Emissions

(2442MHz)

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	2442.000	102.2	36.7	28.5	94.0	114.0	-20.0
Horizontal	4884.000	50.3	36.7	28.5	42.1	74.0	-31.9
Horizontal	7326.000	42.8	36.1	33.1	39.8	74.0	-34.2
Horizontal	9768.000	43.8	36.2	37.8	45.4	74.0	-28.6

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	2442.000	90.6	36.7	28.5	82.4	94.0	-11.6
Horizontal	4884.000	49.5	36.7	28.5	41.3	54.0	-12.7
Horizontal	7326.000	41.5	36.1	33.1	38.5	54.0	-15.5
Horizontal	9768.000	40.5	36.2	37.8	42.1	54.0	-11.9

Notes: 1. Peak Detector Data unless otherwise stated. RBW=1MHz and VBW=3MHz for peak test value, RBW=1MHz and VBW=10Hz for average test value, RBW 3MHz for fundamental emission.

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.

Test Engineer: Robert Li

TRF No.: FCC 15C_TX_b
FCC ID: 2ACYDS001

INTERTEK TESTING SERVICES

Applicant: SwatchMate Pty.Ltd.

Date of Test: 27 October 2014

Model: S001

Sample: 1/1

Worst Case Operating Mode: Transmit

Table 4

Radiated Emissions

(2480MHz)

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	2480.000	102.6	36.7	28.6	94.5	114.0	-19.5
Horizontal	4960.000	48.2	36.7	28.6	40.1	74.0	-33.9
Horizontal	7440.000	41.6	36.1	33.4	38.9	74.0	-35.1
Horizontal	9920.000	33.4	36.3	38.2	35.3	74.0	-38.7

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	2480.000	90.4	36.7	28.6	82.3	94.0	-11.7
Horizontal	4960.000	46.4	36.7	28.6	38.3	54.0	-15.7
Horizontal	7440.000	38.6	36.1	33.4	35.9	54.0	-18.1
Horizontal	9920.000	32.3	36.3	38.2	34.2	54.0	-19.8

Notes: 1. Peak Detector Data unless otherwise stated. RBW=1MHz and VBW=3MHz for peak test value, RBW=1MHz and VBW=10Hz for average test value, RBW 3MHz for fundamental emission.

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.

Test Engineer: Robert Li

TRF No.: FCC 15C_TX_b
FCC ID: 2ACYDS001

INTERTEK TESTING SERVICES

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

0.178 MHz

Judgement: Passed by 18.3 dB margin

TEST PERSONNEL:

Sign on file

Robert Li, Project Engineer
Typed/Printed Name

27 October 2014

Date

INTERTEK TESTING SERVICES

Applicant: SwatchMate Pty.Ltd.

Date of Test: 27 October 2014

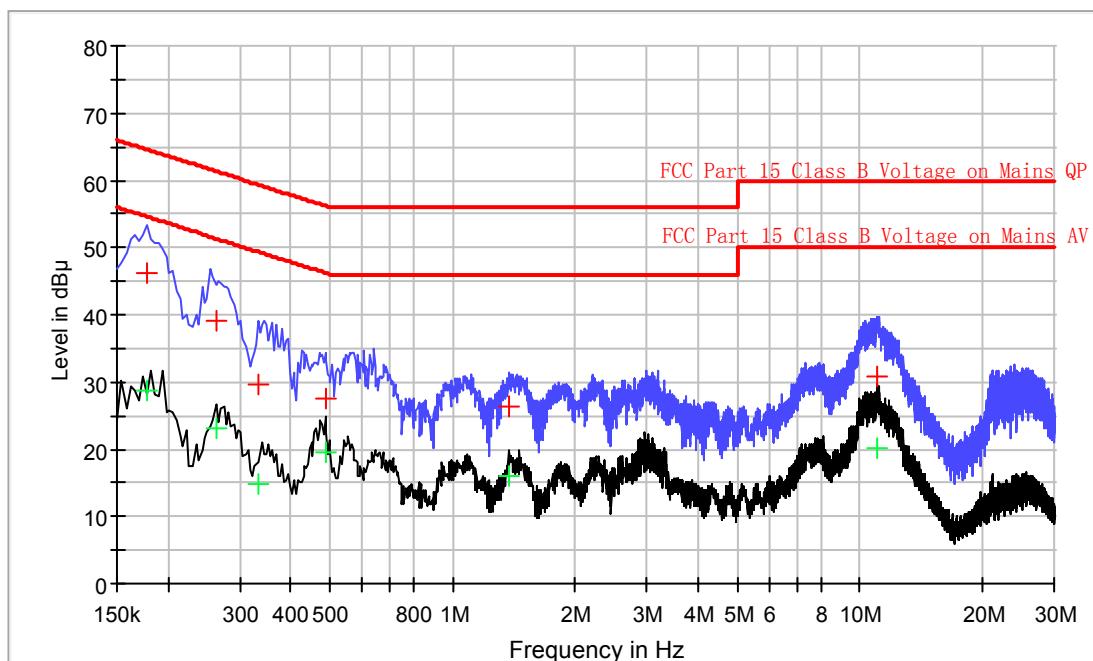
Model: S001

Sample: 1/1

Worst Case Operating Mode: BT Link fully with adapter charging

Phase: Live

Conducted Emission Test – FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μV)	Line	Corr. (dB)	Margin (dB)	Limit (dB μV)
0.178000	46.3	L1	9.8	18.3	64.6
0.262000	39.1	L1	9.8	22.3	61.4
0.334000	29.6	L1	9.8	29.8	59.4
0.486000	27.4	L1	9.8	28.8	56.2
1.374000	26.3	L1	9.9	29.7	56.0
11.046000	30.7	L1	10.1	29.3	60.0

Result Table AV

Frequency (MHz)	Average (dB μV)	Line	Corr. (dB)	Margin (dB)	Limit (dB μV)
0.178000	28.8	L1	9.8	25.8	54.6
0.262000	23.2	L1	9.8	28.2	51.4
0.334000	14.8	L1	9.8	34.6	49.4
0.486000	19.6	L1	9.8	26.6	46.2
1.374000	16.1	L1	9.9	29.9	46.0
11.046000	20.2	L1	10.1	29.8	50.0

TRF No.: FCC 15C_TX_b
FCC ID: 2ACYDS001

INTERTEK TESTING SERVICES

Applicant: SwatchMate Pty.Ltd.

Date of Test: 27 October 2014

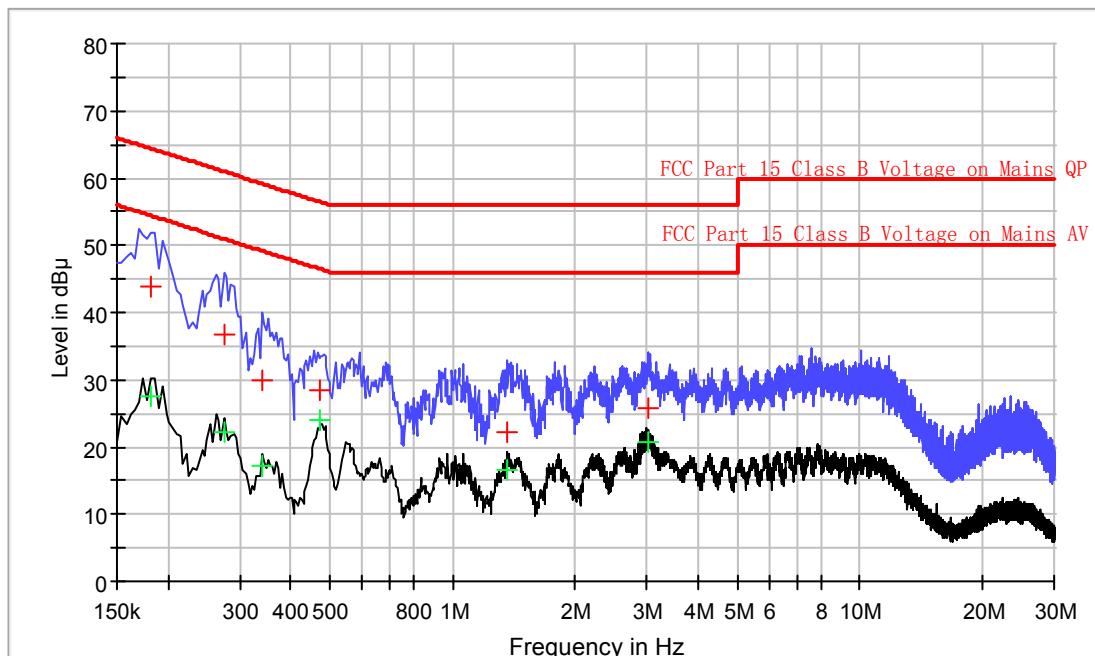
Model: S001

Sample: 1/1

Worst Case Operating Mode: BT Link fully with adapter charging

Phase: Neutral

Conducted Emission Test – FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.182000	43.8	N	10.0	20.6	64.4
0.274000	36.8	N	10.1	24.2	61.0
0.342000	29.8	N	10.1	29.4	59.2
0.474000	28.3	N	10.1	28.1	56.4
1.362000	22.3	N	10.2	33.7	56.0
3.018000	25.9	N	10.3	30.1	56.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.182000	27.4	N	10.0	27.0	54.4
0.274000	22.1	N	10.1	28.9	51.0
0.342000	17.1	N	10.1	32.1	49.2
0.474000	23.9	N	10.1	22.5	46.4
1.362000	16.5	N	10.2	29.5	46.0
3.018000	20.8	N	10.3	25.2	46.0

TRF No.: FCC 15C_TX_b
FCC ID: 2ACYDS001

INTERTEK TESTING SERVICES

EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

INTERTEK TESTING SERVICES

4.0 Equipment Photographs

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

INTERTEK TESTING SERVICES

EXHIBIT 5

PRODUCT LABELLING

INTERTEK TESTING SERVICES

5.0 Product Labelling

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

INTERTEK TESTING SERVICES

EXHIBIT 6

TECHNICAL SPECIFICATIONS

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

EXHIBIT 7

INSTRUCTION MANUAL

INTERTEK TESTING SERVICES

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.

INTERTEK TESTING SERVICES

EXHIBIT 8

MISCELLANEOUS INFORMATION

INTERTEK TESTING SERVICES

8.0 Miscellaneous Information

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

INTERTEK TESTING SERVICES

8.1 Bandedge Plot

For electronic filing, the plot shows the fundamental emission when modulated is saved with filename: bandedge.pdf. From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfils the requirement of 15.249(d).

Peak Measurement

Bandedge compliance is determined by applying marker-delta method, i.e (Bandedge Plot).

(i) Lower channel 2402MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

$$\begin{aligned} &= 93.1 \text{ dB}\mu\text{V/m} - 39.8 \text{ dB} \\ &= 53.3 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (Average value) – delta from the bandedge plot

$$\begin{aligned} &= 82.5 \text{ dB}\mu\text{V/m} - 39.8 \text{ dB} \\ &= 42.7 \text{ dB}\mu\text{V/m} \end{aligned}$$

(ii) Upper channel 2480MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

$$\begin{aligned} &= 94.5 \text{ dB}\mu\text{V/m} - 53.6 \text{ dB} \\ &= 40.9 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (Average value) – delta from the bandedge plot

$$\begin{aligned} &= 82.3 \text{ dB}\mu\text{V/m} - 53.6 \text{ dB} \\ &= 28.7 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74dB μ V/m (Peak Limit) and 54dB μ V/m (Average Limit).

INTERTEK TESTING SERVICES

8.1 Bandedge Plot (cont'd)

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

INTERTEK TESTING SERVICES

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The test signal of the EUT is continuous transmitting emission. With a resolution bandwidth (3dB) of 1MHz, the pulse desensitivity factor is 0dB.

INTERTEK TESTING SERVICES

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 adjust 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. 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.

INTERTEK TESTING SERVICES

8.4 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 (RBW 3MHz for fundamental emission) 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.

INTERTEK TESTING SERVICES

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: Confidential request.pdf.

INTERTEK TESTING SERVICES

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	28-Jun-14	28-Jun-15
SZ185-01	EMI Receiver	R&S	ESCI	100547	10-Mar-14	10-Mar-15
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	03-Sep-14	03-Sep-15
SZ061-08	Horn Antenna	ETS	3115	00092346	19-Oct-14	19-Oct-15
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	29-Apr-14	29-Apr-15
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	10-Mar-14	10-Mar-15
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	10-Mar-14	10-Mar-15
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	19-Apr-14	19-Apr-15
SZ062-02	RF Cable	RADIALL	RG 213U	--	03-Jul-14	03-Jan-15
SZ062-04	RF Cable	RADIALL	RG 213U	--	03-Jul-14	03-Jan-15
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	09-Oct-14	09-Apr-15
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	21-May-14	21-May-15
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	09-Nov-13	09-Nov-14
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	09-Nov-13	09-Nov-14
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	09-Nov-13	09-Nov-14
SZ188-03	Shielding Room	ETS	RFD-100	4100	22-Aug-14	22-Aug-15