Intertek

Valued Quality. Delivered.

Issuing Laboratory:
Intertek Testing Services Hong Kong Limited
HKAS has accredited this laboratory (HOKLAS 005 – TEST) under HOKLAS for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories.

HOKLAS 005 TEST

TEST REPORT

Report No.: 14081158HKG-001

Acoustic Arc International Ltd.

Application
For
Certification
(Original Grant)
(FCC ID: VHC-AAI-BS1420-00)

Transceiver

Prepared and Checked by:

Wong Kwok Yeung, Kenneth
Lead Engineer

Approved by:

Chan Chi Hung, Terry
Supervisor
Date: October 27, 2014

GENERAL INFORMATION

Grantee:	Acoustic Arc International Ltd.
Grantee Address:	Unit 311B, 3/F., IC Development Centre, No. 6 Science Park West Avenue, Shatin, N.T., Hong Kong.
Contact Person:	George Chan
Tel:	(852) 2607 4015
Fax:	(852) 2607 4016
e-mail:	ckmg8@acousticarc.com
Manufacturer:	ShengHai Electronics (Shenzhen) Ltd.
Manufacturer Address:	Block 17&18, Hui Ming Ying Industry, YanChuan, SongGang, Baoan County, Shenzhen, China 518105.
Brand Name:	ARC
Tested Model:	BS1420US
Additional Model:	Laquor, Laquor2, Laquor3, Laquor4
Type of EUT:	Transceiver
Description of EUT:	LAQUOR Bluetooth 6W Speaker
Serial Number:	N/A
FCC ID:	VHC-AAI-BS1420-00
Date of Sample Submitted:	August 28, 2014
Date of Test:	August 28, 2014 to October 03, 2014
Report No.:	14081158HKG-001
Report Date:	October 27, 2014
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

SUMMARY OF TEST RESULT

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Power Line Conducted Emissions	15.207	Pass
Radiated Emission Radiated Emission on the Bandedge	15.249	Pass
Radiated Emission in Restricted Bands	15.205	Pass
Transmitter Field Strength Bandwidth	15.223	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2012 Edition

Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the pervisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB 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.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Table of Contents

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a Bluetooth Speaker with USB Interface. The EUT is using adaptive frequency hopping for Bluetooth module and using 2.3MHz transceiver for signal control, amp and muting. The Bluetooth can support Bluetooth 4.0 BLE and Bluetooth 3.0. The Bluetooth portion operates in frequency range from 2402MHz to 2480MHz The EUT is powered by 7.4VDC (2500mAh Li-ion rechargeable battery). The EUT can charge another device via this USB port (5VDC). The Aux port is for playback MP3 from MP3 device only. The Mirco-USB port is for charging internal rechargeable battery of EUT only.

The Model: Laquor, Laquor2, Laquor3 and Laquor4 are the same as the Model: BS1420US in hardware aspect. The difference in color, cosmetic details, trade name and model number serves as marketing strategy.

Antenna Type: Internal, Integral

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

1.2 Related Submittal(s) Grants

This is a single application for certification of a transceiver.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Preliminary scans were performed to determine 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. Average measurements were performed according to ANSI C63.10 (2009).

1.4 Test Facility

The radiated and conducted measurement facility used to collect the data is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

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 device was powered by Li-ion rechargeable battery 7.4V 2500mAh.

For the AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

For maximizing emissions below 30 MHz, the EUT was rotated through 360・, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emissions at and above 30MHz, 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 3.0.

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 mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

2.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Measurement Uncertainty

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

2.5 Support Equipment List and Description

1. iPhone 5, Model: MD297, FCC ID: BCG-E2599A(Provided by Intertek)
2. iPod Nano, Model: A1446, FCC ID:BCG-A1446A(Provided by Intertek)
3. Aux cable with 1meter long (Provided by Client)
4. USB cable to micro USB cable with 1meter long(Provided by Client)
5. Lenovo Notebook: Model: T61, S/N: L3-CF468, DoC Product (Provided by Intertek)
6. Smart-Drive External Hard Disk, Model: HD3-SU2FW, S/N:0800261, DoC Product(Provided by Intertek)
7. 2xUSB cable with 1meter long (Provided by Intertek)
8. 1394 cable with 0.8 meter long (Provided by Intertek)
9. AC adaptor for Notebook: 100-240V 1.7A to 19.5V 3.33A Model:HSTNN-CA15

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

3.0 Emission Results

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.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG - AV

where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF

where FS = Field Strength in dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
RR = 18.0 dBµV
LF = 9.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

Level in µV/m = Common Antilogarithm [(27 dBµV/m)/20] = 22.4 µV/m

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 2402.000 and 2480.000 MHz

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

3.3 Radiated Emission Data

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

Judgment: Passed by 7.0 dB compared with peak limit

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.555 MHz

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conducted photo.pdf.

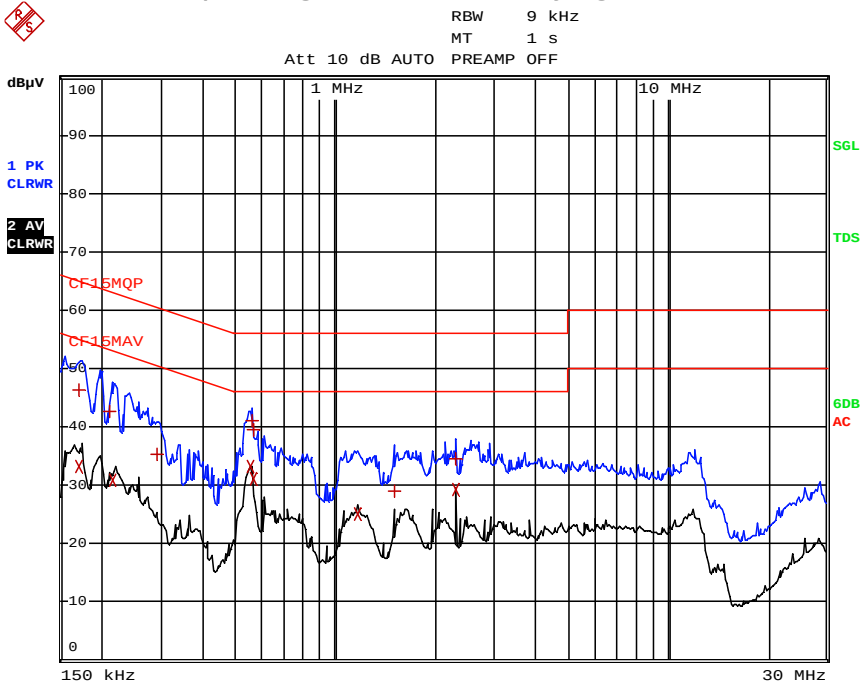
3.5 Conducted Emission Data

For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Pass by 12.87 dB compared with average limit.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Worst-Case Operating Mode: Music Playing Via Bluetooth and sharing music



EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	172.5 kHz	46.25	N	-18.58
2	CISPR Average	172.5 kHz	33.19	N	-21.64
1	Quasi Peak	213 kHz	42.71	N	-20.37
2	CISPR Average	217.5 kHz	30.78	N	-22.12
1	Quasi Peak	294 kHz	35.33	L1	-25.08
2	CISPR Average	555 kHz	33.12	N	-12.87
1	Quasi Peak	559.5 kHz	40.97	N	-15.02
1	Quasi Peak	568.5 kHz	39.45	N	-16.54
2	CISPR Average	568.5 kHz	31.14	N	-14.85
2	CISPR Average	1.1715 MHz	24.94	N	-21.06
1	Quasi Peak	1.509 MHz	29.06	N	-26.93
1	Quasi Peak	2.2965 MHz	34.47	L1	-21.52
2	CISPR Average	2.301 MHz	29.31	N	-16.68

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Applicant: Acoustic Arc International Ltd. Date of Test: October 03, 2014
Model: BS1420US
Worst-Case Operating Mode: Transmitting (Bluetooth 4.0)

Table 1
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2402.000	110.6	33	29.4	107.0	40	67.0	94.0	-27.0
V	***4804.000***	***58.7***	***33***	***34.9***	***60.6***	***40***	***20.6***	***54.0***	***-33.4***
V	7206.000	48.6	33	37.9	53.5	40	13.5	54.0	-40.5
V	9608.000	48.4	33	40.4	55.8	40	15.8	54.0	-38.2
V	***12010.000***	***51.9***	***33***	***40.5***	***59.4***	***40***	***19.4***	***54.0***	***-34.6***
V	14412.000	54.9	33	40.0	61.9	40	21.9	54.0	-32.1

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2402.000	110.6	33	29.4	107.0	114.0	-7.0
V	***4804.000***	***58.7***	***33***	***34.9***	***60.6***	***74.0***	***-13.4***
V	7206.000	48.6	33	37.9	53.5	74.0	-20.5
V	9608.000	48.4	33	40.4	55.8	74.0	-18.2
V	***12010.000***	***51.9***	***33***	***40.5***	***59.4***	***74.0***	***-14.6***
V	14412.000	54.9	33	40.0	61.9	74.0	-12.1

NOTES: 1. Peak Detector Data unless otherwise 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 sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Applicant: Acoustic Arc International Ltd. Date of Test: October 03, 2014
Model: BS1420US
Worst-Case Operating Mode: Transmitting (Bluetooth 4.0)

Table 2
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2440.000	110.1	33	29.4	106.5	40	66.5	94.0	-27.5
V	***4880.000***	***58.9***	***33***	***34.9***	***60.8***	***40***	***20.8***	***54.0***	***-33.2***
V	***7320.000***	***48.8***	***33***	***37.9***	***53.7***	***40***	***13.7***	***54.0***	***-40.3***
V	9760.000	48.5	33	40.4	55.9	40	15.9	54.0	-38.1
V	***12200.000***	***52.3***	***33***	***40.5***	***59.8***	***40***	***19.8***	***54.0***	***-34.2***
V	14640.000	56.6	33	38.4	62.0	40	22.0	54.0	-32.0

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2440.000	110.1	33	29.4	106.5	114.0	-7.5
V	***4880.000***	***58.9***	***33***	***34.9***	***60.8***	***74.0***	***-13.2***
V	***7320.000***	***48.8***	***33***	***37.9***	***53.7***	***74.0***	***-20.3***
V	9760.000	48.5	33	40.4	55.9	74.0	-18.1
V	***12200.000***	***52.3***	***33***	***40.5***	***59.8***	***74.0***	***-14.2***
V	14640.000	56.6	33	38.4	62.0	74.0	-12.0

NOTES: 1. Peak Detector Data unless otherwise 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 sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Applicant: Acoustic Arc International Ltd. Date of Test: October 03, 2014
Model: BS1420US
Worst-Case Operating Mode: Transmitting (Bluetooth 4.0)

Table 3
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	110.6	33	29.4	107.0	40	67.0	94.0	-27.0
V	***4960.000***	***59.6***	***33***	***34.9***	***61.5***	***40***	***21.5***	***54.0***	***-32.5***
V	***7440.000***	***49.0***	***33***	***37.9***	***53.9***	***40***	***13.9***	***54.0***	***-40.1***
V	9920.000	48.2	33	40.4	55.6	40	15.6	54.0	-38.4
V	***12400.000***	***52.4***	***33***	***40.5***	***59.9***	***40***	***19.9***	***54.0***	***-34.1***
V	14880.000	56.9	33	38.4	62.3	40	22.3	54.0	-31.7

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	110.6	33	29.4	107.0	114.0	-7.0
V	***4960.000***	***59.6***	***33***	***34.9***	***61.5***	***74.0***	***-12.5***
V	***7440.000***	***49.0***	***33***	***37.9***	***53.9***	***74.0***	***-20.1***
V	9920.000	48.2	33	40.4	55.6	74.0	-18.4
V	***12400.000***	***52.4***	***33***	***40.5***	***59.9***	***74.0***	***-14.1***
V	14880.000	56.9	33	38.4	62.3	74.0	-11.7

NOTES: 1. Peak Detector Data unless otherwise 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 sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Applicant: Acoustic Arc International Ltd. Date of Test: October 03, 2014
Model: BS1420US
Worst-Case Operating Mode: Transmitting (Bluetooth 3.0)

Table 4
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2402.000	108.9	33	29.4	105.3	24	81.3	94.0	-12.7
H	***4804.000***	***59.3***	***33***	***34.9***	***61.2***	***24***	***37.2***	***54.0***	***-16.8***
V	7206.000	49.6	33	37.9	54.5	24	30.5	54.0	-23.5
V	9608.000	49.4	33	40.4	56.8	24	32.8	54.0	-21.2
V	***12010.000***	***52.9***	***33***	***40.5***	***60.4***	***24***	***36.4***	***54.0***	***-17.6***
V	14412.000	55.3	33	40.0	62.3	24	38.3	54.0	-15.7

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2402.000	108.9	33	29.4	105.3	114.0	-8.7
H	***4804.000***	***59.3***	***33***	***34.9***	***61.2***	***74.0***	***-12.8***
V	7206.000	49.6	33	37.9	54.5	74.0	-19.5
V	9608.000	49.4	33	40.4	56.8	74.0	-17.2
V	***12010.000***	***52.9***	***33***	***40.5***	***60.4***	***74.0***	***-13.6***
V	14412.000	55.3	33	40.0	62.3	74.0	-11.7

NOTES: 1. Peak Detector Data unless otherwise 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 sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Applicant: Acoustic Arc International Ltd. Date of Test: October 03, 2014
Model: BS1420US
Worst-Case Operating Mode: Transmitting (Bluetooth 3.0)

Table 5
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2440.000	110.1	33	29.4	106.5	24	82.5	94.0	-11.5
H	***4880.000***	***59.8***	***33***	***34.9***	***61.7***	***24***	***37.7***	***54.0***	***-16.3***
V	***7320.000***	***49.3***	***33***	***37.9***	***54.2***	***24***	***30.2***	***54.0***	***-23.8***
V	9760.000	49.5	33	40.4	56.9	24	32.9	54.0	-21.1
V	***12200.000***	***53.3***	***33***	***40.5***	***60.8***	***24***	***36.8***	***54.0***	***-17.2***
V	14640.000	57.3	33	38.4	62.7	24	38.7	54.0	-15.3

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2440.000	110.1	33	29.4	106.5	114.0	-7.5
H	***4880.000***	***59.8***	***33***	***34.9***	***61.7***	***74.0***	***-12.3***
V	***7320.000***	***49.3***	***33***	***37.9***	***54.2***	***74.0***	***-19.8***
V	9760.000	49.5	33	40.4	56.9	74.0	-17.1
V	***12200.000***	***53.3***	***33***	***40.5***	***60.8***	***74.0***	***-13.2***
V	14640.000	57.3	33	38.4	62.7	74.0	-11.3

NOTES: 1. Peak Detector Data unless otherwise 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 sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Applicant: Acoustic Arc International Ltd. Date of Test: October 03, 2014
Model: BS1420US
Worst-Case Operating Mode: Transmitting (Bluetooth 3.0)

Table 6
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	110.6	33	29.4	107.0	24	83.0	94.0	-11.0
H	***4960.000***	***59.6***	***33***	***34.9***	***61.5***	***24***	***37.5***	***54.0***	***-16.5***
V	***7440.000***	***51.8***	***33***	***37.9***	***56.7***	***24***	***32.7***	***54.0***	***-21.3***
V	9920.000	42.3	33	40.4	49.7	24	25.7	54.0	-28.3
V	***12400.000***	***52.8***	***33***	***40.5***	***60.3***	***24***	***36.3***	***54.0***	***-17.7***
V	14880.000	57.1	33	38.4	62.5	24	38.5	54.0	-15.5

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	110.6	33	29.4	107.0	114.0	-7.0
H	***4960.000***	***59.6***	***33***	***34.9***	***61.5***	***74.0***	***-12.5***
V	***7440.000***	***51.8***	***33***	***37.9***	***56.7***	***74.0***	***-17.3***
V	9920.000	42.3	33	40.4	49.7	74.0	-24.3
V	***12400.000***	***52.8***	***33***	***40.5***	***60.3***	***74.0***	***-13.7***
V	14880.000	57.1	33	38.4	62.5	74.0	-11.5

NOTES: 1. Peak Detector Data unless otherwise 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 sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Applicant: Acoustic Arc International Ltd. Date of Test: October 03, 2014
Model: BS1420US
Worst-Case Operating Mode: Music play via Bluetooth and sharing music

Table 7

Radiated Emissions
Pursuant to FCC Part 15 Section 15.209 Requirement

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	33.868	37.8	16	10.0	31.8	40.0	-8.2
V	144.002	30.0	16	14.0	28.0	43.5	-15.5
H	156.001	30.5	16	16.0	30.5	43.5	-13.0
H	179.982	24.5	16	20.0	28.5	43.5	-15.0
H	192.002	30.1	16	16.0	30.1	43.5	-13.4
H	306.198	24.3	16	23.0	31.3	46.0	-14.7
H	528.395	24.4	16	27.0	35.4	46.0	-10.6
H	620.875	22.3	16	29.0	35.3	46.0	-10.7

NOTES: 1. Peak Detector Data unless otherwise 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 sign in the column shows value below limit.

4. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Applicant: Acoustic Arc International Ltd. Date of Test: October 03, 2014
Model: BS1420US
Worst-Case Operating Mode: Share Music control

Table 8

Radiated Emissions
Pursuant to FCC Part 15 Section 15.223 Requirement

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Distance Factor (-dB)	Calculated at 30m (dBµV/m)	Limit at 30m (dBµV/m)	Margin (dB)
V	2.300	27.6	0	11.7	39.3	40	-0.7	23.5	-24.2
V	2.971	26.8	0	11.6	38.4	40	-1.6	23.5	-25.1
H	3.363	25.6	0	11.6	37.2	40	-2.8	23.5	-26.3
H	4.119	24.9	0	11.6	36.5	40	-3.5	23.5	-27.0
H	4.483	23.6	0	11.6	35.2	40	-4.8	23.5	-28.3
H	5.603	22.5	0	11.7	34.2	40	-5.8	23.5	-29.3
H	6.891	20.6	0	11.8	32.4	40	-7.6	23.5	-31.1
H	8.207	19.2	0	11.8	31.0	40	-9.0	23.5	-32.5
H	9.200	26.2	0	12.0	38.2	40	-1.8	23.5	-25.3
H	11.500	12.8	0	12.4	25.2	40	-14.8	29.5	-44.3

NOTES: 1. Peak Detector Data unless otherwise 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 sign in the column shows value below limit.

4. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

5. Loop antenna is used for the emissions below 30MHz.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

4.0 Equipment Photographs

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

5.0 Product Labelling

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

6.0 Technical Specifications

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

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 Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

8.0 Miscellaneous Information

The miscellaneous information includes details of the test procedure and measured bandwidth / calculation of factor such as pulse desensitization and averaging factor (calculation and timing diagram).

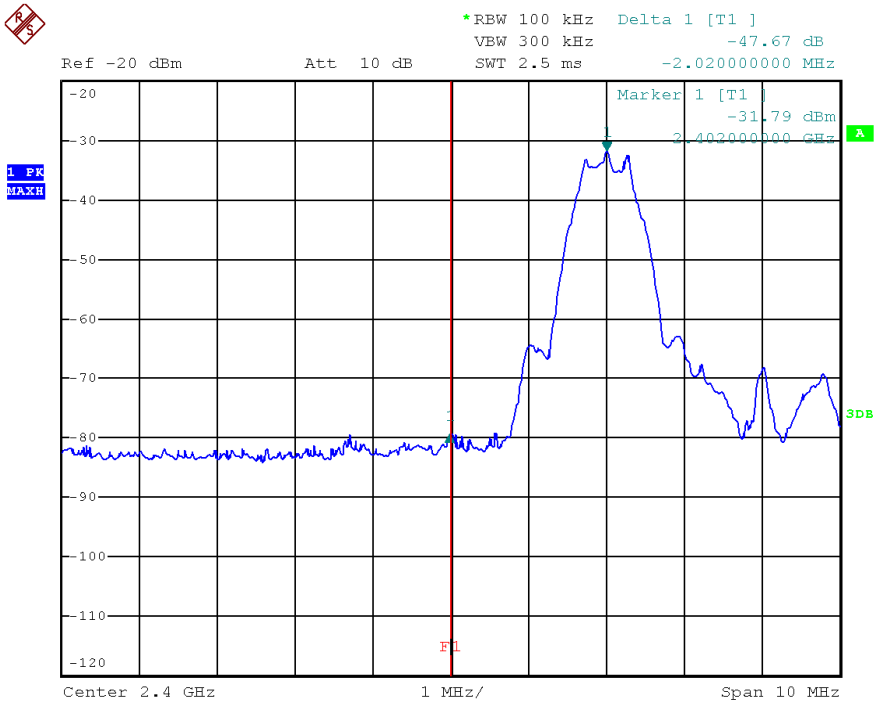
8.1 Radiated Emission on the Bandedge

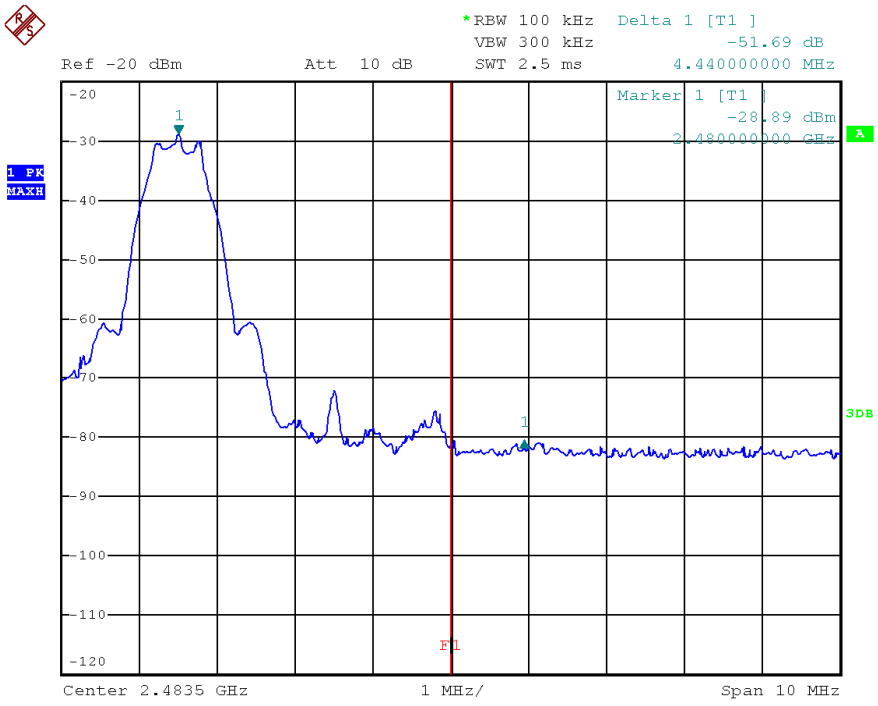
From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique as according to C63.10 (2009) is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2009) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Peak Measurement (Bluetooth 4.0)





Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Peak Measurement (Bluetooth 4.0)

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

Lower bandedge

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

=107.0 dBµV/m - 47.67 dB
=59.3 dBµV/m

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

=67.0 dBµV/m - 47.67 dB
=19.3 dBµV/m

Upper bandedge

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

=107.0 dBµV/m - 51.69 dB
=55.3 dBµV/m

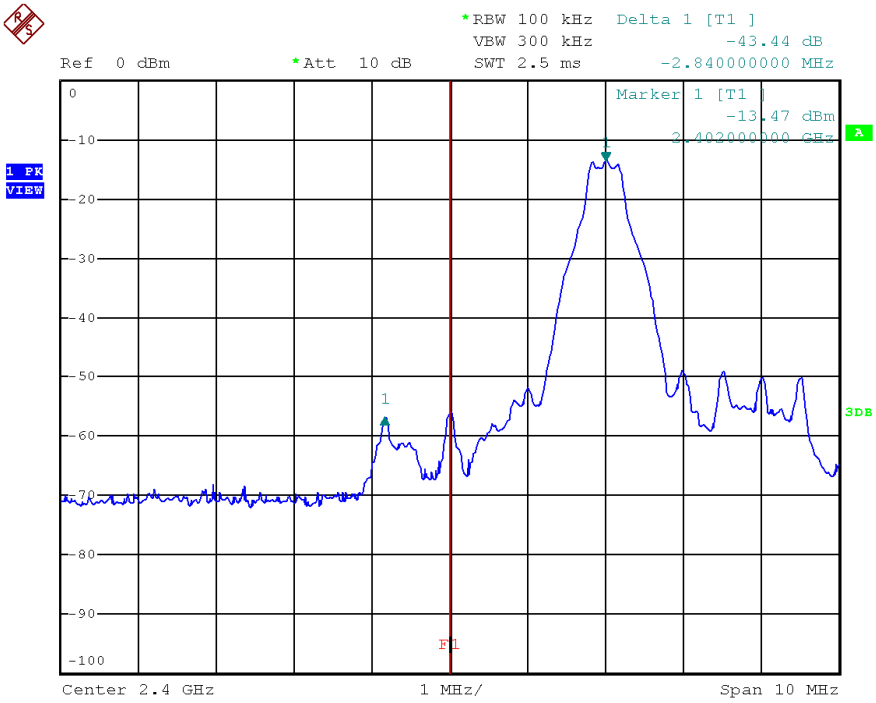
Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

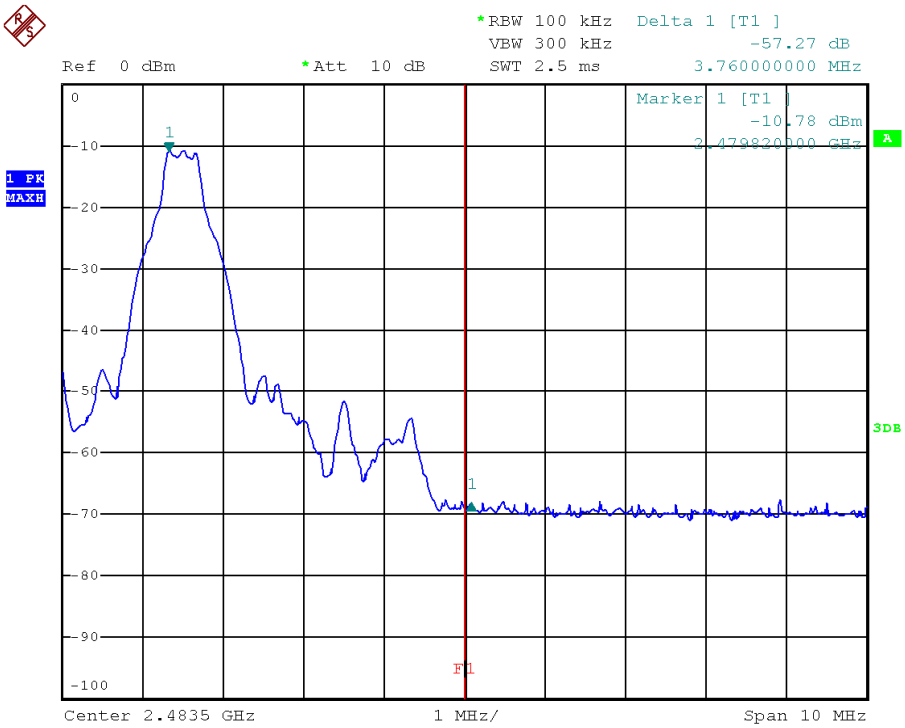
=67.0 dBµV/m - 51.69 dB
=15.3 dBµV/m

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

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Peak Measurement (Bluetooth 3.0)





Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Peak Measurement (Bluetooth 3.0)

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

Lower bandedge

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

=105.3 dBµV/m – 43.44dB
=61.9BµV/m

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

=81.3 dBµV/m – 43.44 dB
=37.9 dBµV/m

Upper bandedge

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

=107.0 dBµV/m – 57.27dB
=49.7 dBµV/m

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

=83.0 dBµV/m – 57.27dB
=25.7dBµV/m

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

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

8.2 Discussion of Pulse Desensitization

For Bluetooth 4.0: Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 0.1ms for a digital "1" bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 3MHz, so the pulse desensitivity factor is 0dB.

For Bluetooth 3.0: Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 0.625ms for a digital "1" bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 3MHz, so the pulse desensitivity factor is 0dB.

8.3 Calculation of Average Factor

(For Bluetooth 4.0)

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 100 ms

Effective period of the cycle = 0.1x10

DC = 1 / 100 = 0.01

Therefore, the averaging factor is found by 20log 0.01 = -40dB.

(For Bluetooth 3.0)

Based on the Bluetooth Specification Version 3.0 + EDR, the transmitter ON time for each timeslot of Bluetooth is 625µs. DH5 has the maximum duty cycle, which consists of 5 continuous Tx slots and 1 Rx slot. Therefore one hopset take (5+1) x 625µs = 3.75ms. For one period for a pseudo-random hopping through at least 20 RF channels in adaptive mode (worse case), it take: 20 x 3.75ms = 75ms.

The dwell time for DH5 is 5 x 625µs = 3.125ms.

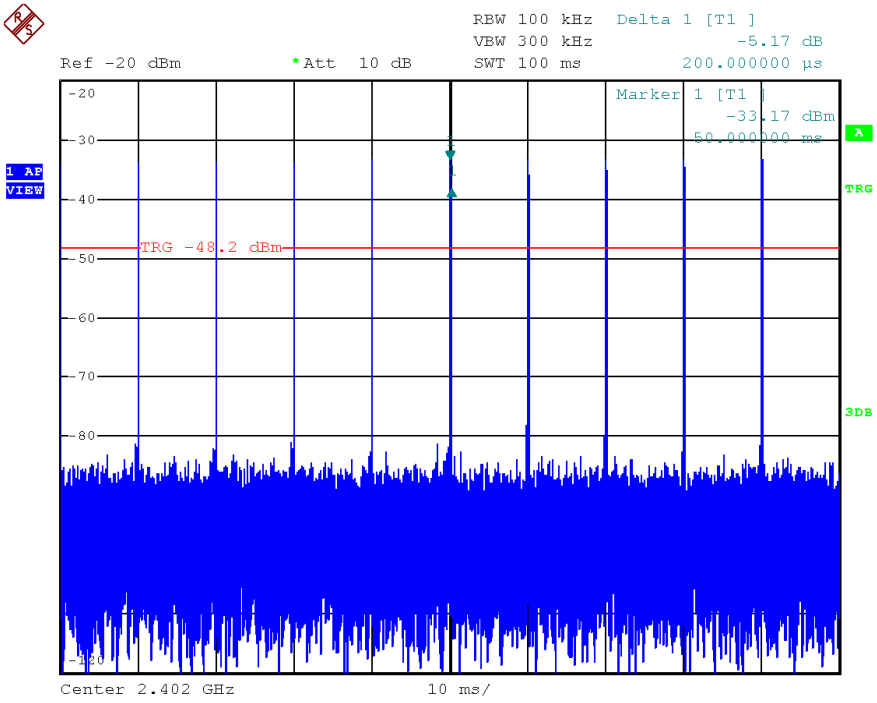
For the worst case calculation, there are two transmissions might occur in 100ms. Therefore,

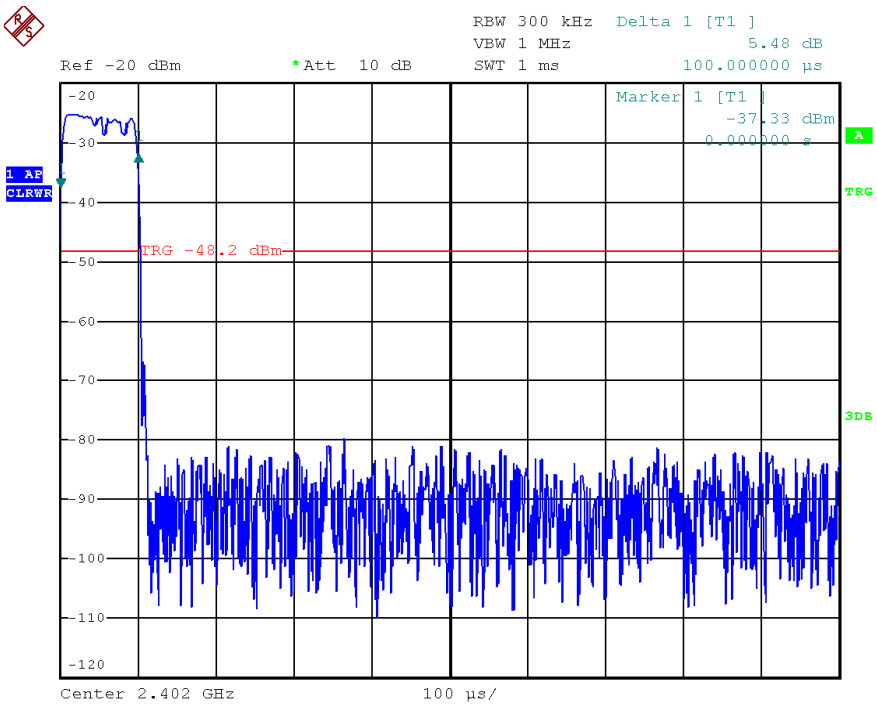
Duty Cycle (DC) = Maximum On time in 100ms/100ms
= 3.125ms x 2/100ms
= 0.0625

Average Factor (AF) of Bluetooth in dB = $20 \log_{10} (0.0625)$
= -24 dB

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

Average Factor (Bluetooth 4.0)





Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

8.4 Emissions Test Procedures

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

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 axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

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. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

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. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

8.4 Emissions Test Procedures (cont'd)

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

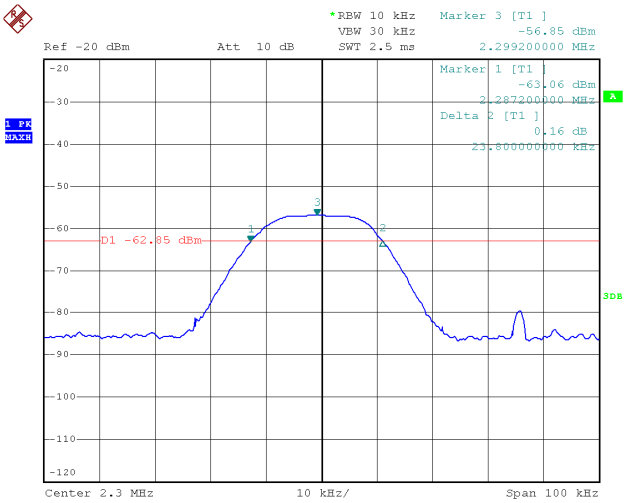
AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 (2009).

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 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. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 3 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden 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, unless otherwise reported. Measurements taken at a closer distance are so marked.

8.5 Bandwidth for 2.3MHz



Date: 8.NOV.2014 13:14:24

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

9.0 **Confidentiality Request**

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: request.pdf.

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com

10.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2666	EW-0571	EW-0572
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI7	3104C	3146
Calibration Date	Jun. 20, 2013	Nov. 01, 2013	Jun. 26, 2013
Calibration Due Date	Dec. 20, 2014	May 01, 2015	Dec. 26, 2014

Equipment	Spectrum Analyzer	Pyramidal Horn Antenna	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-0905	EW-1133
Manufacturer	R&S	EMCO	EMCO
Model No.	FSP40	3160-09	3115
Calibration Date	May. 08, 2014	Jan. 28, 2014	Apr. 30, 2014
Calibration Due Date	May. 08, 2015	Jul. 28, 2015	Oct. 30, 2015

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2666	EW-2501
Manufacturer	R&S	R&S
Model No.	ESCI7	ENV-216
Calibration Date	Jun. 20, 2013	Dec. 25, 2013
Calibration Due Date	Dec. 20, 2014	Nov. 30, 2014

3) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2329
Manufacturer	R&S
Model No.	FSP3
Calibration Date	Jun. 19, 2014
Calibration Due Date	Jun. 19, 2015

END OF TEST REPORT

Intertek Testing Services Hong Kong Ltd.
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-etlsemko.com