

i.Tech Dynamic Ltd.

Application
For
Certification

Bluetooth Headset

(FCC ID: RKIC51-B908-XX)

HK09070804-1

KS/cl

July 24, 2009

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MEASUREMENT/TECHNICAL REPORT

I.Tech Dynamic Ltd. - Model: C51-B908-XX
FCC ID: RKIC51-B908-XX

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

Equipment Type : DXX - Lower Power 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 [10-01-08
Edition] Provision.

Report prepared by:

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EXHIBIT 1 GENERAL DESCRIPTION

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1.0 General Description

1.1 Product Description

The C51-B908-XX is a Solar Bluetooth Headset Portable Handsfree Communication Device built on Bluetooth wireless technology. This headset is designed and manufactured in accordance with Bluetooth v2.1 with EDR. It operates from 2402MHz to 2480MHz, and its product name is i.Tech SolarVoice 908. The battery for this headset is internal and rechargeable using either a switching power adaptor (100-240VAC to 5VDC 500mA, model: SSA-3P 050050US) or an USB port. After pairing and connecting the headset with the mobile phone, it can make and receive call from the mobile.

The antennas used in headset is integral, and the tested sample is a prototype.

The suffix, XX, indicates different color of enclosure. The difference in model number serves as marketing strategy.

The circuit description is saved with filename: descri.pdf

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1.2 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). Preliminary radiated scans were performed in the Open Area Test Site only to determine worst case modes. All radiated measurements were performed in Open Area Test Sites. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data and conducted data are located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

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EXHIBIT 2 SYSTEM TEST CONFIGURATION

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2.0 System Test Configuration

2.1 Justification

For emissions testing, the equipment under test (EUT) was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions. The headset was powered by a fully charged battery.

For the measurements, the EUT is attached to a plastic stand if necessary and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

Measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

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

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF*. The effective period (τ_{eff}) was 625 μ s for Bluetooth. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3 dB, the pulse desensitization factor was 0 dB.

All relevant operation modes such as Standalone Talk and Talk with charging via AC adaptor and USB port have been tested, and the worst-case data is included in this report.

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.

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2.3 Details of EUT and Description of Peripherals

Details of EUT:

An AC adaptor (provided with the unit) were used to power the device. Their description are listed below.

- (1) An AC adaptor (100-240VAC to 5VDC 500mA, Model: SSA-3P 050050US) (Supplied by Client)

Description of Peripherals:

- (1) Nokia Mobile Phone, Model: 5300, FCC ID: PPIRM-146 (Supplied by Intertek)
- (2) 1 x serial cable with 1 meter long (Supplied by Intertek)
- (3) 1 x parallel cable with 1 meter long (Supplied by Intertek)
- (4) 1 x charging USB cable A to Micro B 8-pin with 1.5 meter long (Supplied by Client)
- (5) HP Computer, Model: DC5100, S/N: CNG611064K (Supplied by Intertek)
- (6) HP Keyboard, Model: SK-2502C, S/N: M000626313 (Supplied by Intertek)
- (7) Samsung Monitor, Model: 152N, S/N: NB15HMEWA08791 (Supplied by Intertek)
- (8) HP Mouse, Model: M-S34, S/N: LZC01306539 (Supplied by Intertek)
- (9) HP Printer, Model: C6431D, S/N: CN23B 680ZP (Supplied by Intertek)
- (10) Genius Modem, Model: GM56EX, S/N: ZT5505000355 (Supplied by Intertek)

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2.4 Measurement Uncertainty

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

2.5 Equipment Modification

Any modifications installed previous to testing by i.Tech Dynamic Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Commercial & Electrical Division, Intertek Testing Services Hong Kong Ltd.

All the items listed under section 2.0 of this report are confirmed by:

Confirmed by:

*Sit Kim Wai, Ken
Manager
Intertek Testing Services
Agent for i.Tech Dynamic Ltd.*



Signature

July 24, 2009

Date

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EXHIBIT 3 EMISSION RESULTS

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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.

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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) from the measured reading. The basic equation with a sample calculation is as follows:

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

where FS = Field Strength in $\text{dB}\mu\text{V/m}$
 RA = Receiver Amplitude (including preamplifier) in $\text{dB}\mu\text{V}$
 CF = Cable Attenuation Factor in dB
 AF = Antenna Factor in dB
 AG = Amplifier Gain 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 $\text{dB}\mu\text{V/m}$
 $RR = RA - AG$ in $\text{dB}\mu\text{V}$
 $LF = CF + AF$ in dB

Assume a receiver reading of $52.0 \text{ dB}\mu\text{V}$ 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, giving a field strength of $32 \text{ dB}\mu\text{V/m}$. This value in $\text{dB}\mu\text{V/m}$ was converted to its corresponding level in $\mu\text{V/m}$.

$RA = 52.0 \text{ dB}\mu\text{V}$	
$AF = 7.4 \text{ dB}$	$RR = 23.0 \text{ dB}\mu\text{V}$
$CF = 1.6 \text{ dB}$	$LF = 9.0 \text{ dB}$
$AG = 29.0 \text{ dB}$	
$FS = RR + LF$	
$FS = 23 + 9 = 32 \text{ dB}\mu\text{V/m}$	

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

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission

at 64.248 MHz

The worst case radiated emission configuration photographs are saved with filename: config photos.pdf

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3.3 Radiated Emission Data

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

Judgement : Passed by 5.8 dB margin

TEST PERSONNEL:



Tester Signature

Jess Tang, Lead Engineer
Typed/Printed Name

July 24, 2009
Date

INTERTEK TESTING SERVICES

Applicant: i.Tech Dynamic Ltd.
Model: C51-B908-XX
Mode : TX-Channel 0 (Charging by AC Adaptor)

Date of Test: July 6-10, 2009

Table 1

Radiated Emissions Pursuant to FCC Part 15 Section 15.249(a) Requirements

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2402.000	99.2	33	29.4	43.9	51.7	94.0	-42.3
V	*4804.000	51.5	33	34.9	43.9	9.5	54.0	-44.5
H	7206.000	44.5	33	37.9	43.9	5.5	54.0	-48.5
H	9608.000	41.0	33	40.4	43.9	4.5	54.0	-49.5
H	*12010.000	40.4	33	40.5	43.9	4.0	54.0	-50.0
H	14412.000	40.6	33	40.0	43.9	3.7	54.0	-50.3

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2402.000	99.2	33	29.4	95.6	114.0	-18.4
V	*4804.000	51.5	33	34.9	53.4	74.0	-20.6
H	7206.000	44.5	33	37.9	49.4	74.0	-24.6
H	9608.000	41.0	33	40.4	48.4	74.0	-25.6
H	*12010.000	40.4	33	40.5	47.9	74.0	-26.1
H	14412.000	40.6	33	40.0	47.6	74.0	-26.4

- NOTES: 1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

Test Report Number: HK09070804-1
FCC ID: RKIC51-B908-XX

INTERTEK TESTING SERVICES

Applicant: i.Tech Dynamic Ltd.
Model: C51-B908-XX
Mode : TX-Channel 39 (Charging by AC Adaptor)

Date of Test: July 6-10, 2009

Table 2

Radiated Emissions Pursuant to FCC Part 15 Section 15.249(a) Requirements

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
V	2441.000	99.0	33	29.4	43.9	51.5	94.0	-42.5
V	*4882.000	51.3	33	34.9	43.9	9.3	54.0	-44.7
H	*7323.000	44.3	33	37.9	43.9	5.3	54.0	-48.7
H	9764.000	41.6	33	40.4	43.9	5.1	54.0	-48.9
H	*12205.000	40.7	33	40.5	43.9	4.3	54.0	-49.7
H	14646.000	41.8	33	38.4	43.9	3.3	54.0	-50.7

Polarization	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)
V	2441.000	99.0	33	29.4	95.4	114.0	-18.6
V	*4882.000	51.3	33	34.9	53.2	74.0	-20.8
H	*7323.000	44.3	33	37.9	49.2	74.0	-24.8
H	9764.000	41.6	33	40.4	49.0	74.0	-25.0
H	*12205.000	40.7	33	40.5	48.2	74.0	-25.8
H	14646.000	41.8	33	38.4	47.2	74.0	-26.8

- NOTES: 1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

Test Report Number: HK09070804-1
FCC ID: RKIC51-B908-XX

INTERTEK TESTING SERVICES

Applicant: i.Tech Dynamic Ltd.
Model: C51-B908-XX
Mode : TX-Channel 78 (Charging by AC Adaptor)

Date of Test: July 6-10, 2009

Table 3

Radiated Emissions Pursuant to FCC Part 15 Section 15.249(a) Requirements

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	2480.000	98.9	33	29.4	43.9	51.4	94.0	-42.6
V	*4960.000	51.5	33	34.9	43.9	9.5	54.0	-44.5
H	*7440.000	44.7	33	37.9	43.9	5.7	54.0	-48.3
H	9920.000	41.8	33	40.4	43.9	5.3	54.0	-48.7
H	*12400.000	40.5	33	40.5	43.9	4.1	54.0	-49.9
H	14880.000	42.2	33	38.4	43.9	3.7	54.0	-50.3

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	2480.000	98.9	33	29.4	95.3	114.0	-18.7
V	*4960.000	51.5	33	34.9	53.4	74.0	-20.6
H	*7440.000	44.7	33	37.9	49.6	74.0	-24.4
H	9920.000	41.8	33	40.4	49.2	74.0	-24.8
H	*12400.000	40.5	33	40.5	48.0	74.0	-26.0
H	14880.000	42.2	33	38.4	47.6	74.0	-26.4

- NOTES: 1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

Test Report Number: HK09070804-1
FCC ID: RKIC51-B908-XX

INTERTEK TESTING SERVICES

Applicant: i.Tech Dynamic Ltd.
Model: C51-B908-XX
Mode : Talk (Charging by AC Adaptor)

Date of Test: July 6-10, 2009

Table 4

Radiated Emissions
Pursuant to FCC Part 15 Section 15.209 Requirements

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	38.429	39.6	16	10.0	33.6	40.0	-6.4
V	45.621	39.9	16	10.0	33.9	40.0	-6.1
H	55.679	39.1	16	11.0	34.1	40.0	-5.9
H	64.248	41.2	16	9.0	34.2	40.0	-5.8
H	*108.384	35.8	16	14.0	33.8	43.5	-9.7
H	*162.529	32.4	16	16.0	32.4	43.5	-11.1

- NOTES: 1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
- * Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

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3.4 Radiated Emission on the Bandedge , FCC Rule 15.249(d)

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 is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2003) for frequency being measured.

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

Please refer to the following plots for radiated emission on the bandedge:

Low Channel Emissions

High Channel Emissions

The above plots are saved with filename: emission.pdf

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 expected variations in temperature and supply voltage were considered.

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3.5 Line Conducted Configuration Photograph

Worst Case Line-Conducted Configuration

at 0.312 MHz

The worst case line conducted configuration photographs are saved with filename: config photos.pdf

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3.6 Line Conducted Emission Data

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

Judgement : Passed by 17.75 dB margin compared with average limit

TEST PERSONNEL:



Tester Signature

Jess Tang, Lead Engineer
Typed/Printed Name

July 24, 2009
Date

INTERTEK TESTING SERVICES

Applicant: i.Tech Dynamic Ltd.
Model: C51-B908-XX

Date of Test: July 6-10, 2009

Conducted Emissions Pursuant to FCC Part 15 Section 15.207 Requirements

The conducted emission test result is saved with filename: conduct.pdf

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3.7 Transmitter Duty Cycle Calculation, FCC Rule 15.35(b, c)

Based on the Bluetooth Specification Version 2.1 + EDR, transmitter ON time is independent of the packet type (DH1, DH3 and DH5) and packet length (single-slot and multi-slot). The maximum transmitter ON time for the Bluetooth is 625 μ s.

Each TX and RX time slot is 625 μ s in length. A TDD scheme is used where master and slave alternately transmit. For one period for a pseudo-random hopping through all 79 RF channels, it takes: $79 \times (0.625 \times 2)\text{ms} = 98.75\text{ms}$.

Therefore,

$$\begin{aligned}\text{Average Factor (AF) of Bluetooth in dB} &= 20 \log_{10} (0.625/98.75) \text{ dB} \\ &= 20 \log_{10} (0.00633) \text{ dB} \\ &= -43.9\text{dB}\end{aligned}$$

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EXHIBIT 4 EQUIPMENT LIST

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4.0 Equipment List

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer	Biconical Antenna
Registration No.	EW-0014	EW-2188	EW-0954
Manufacturer	R&S	AGILENTTECH	EMCO
Model No.	ESVS30	E4407B	3104C
Calibration Date	Jun. 01, 2009	Dec. 18, 2008	Sep. 30, 2008
Calibration Due Date	Jun. 01, 2010	Dec. 18, 2009	Mar. 30, 2010

Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	RF Amplifier
Registration No.	EW-0446	EW-1015	EW-1779
Manufacturer	EMCO	EMCO	MITEQ
Model No.	3146	3115	AMF-4D-001120-34-13P
Calibration Date	Oct. 02, 2008	Jul. 28, 2008	Jul. 05, 2008
Calibration Due Date	Apr. 02, 2010	Jan. 28, 2010	Aug. 01, 2009

2) Conducted Emissions Test

Equipment	Pulse Limiter	Artificial Mains	EMI Test Receiver
Registration No.	EW-0698	EW-0192	EW-2251
Manufacturer	R&S	R&S	R&S
Model No.	ESH3-Z2	ESH3-Z5	ESCI
Calibration Date	Feb. 03, 2009	Nov. 12, 2008	Oct. 28, 2008
Calibration Due Date	Feb. 03, 2010	Nov. 12, 2009	Oct. 28, 2009