TEST REPORT

Report No.: HK12070961-1

Hong Tian Tai (H.K.) Co., Ltd.

Application
For
Certification
(Original Grant)
(FCC ID: P5Q1648205)

Transceiver

Prepared and Checked by:

Signed On File
Mark Cheung
Lead Engineer

Approved by:

Digitally signed by Terry Chan
Location: Intertek Testing Services Hong Kong Ltd.

Chan Chi Hung, Terry
Assistant Supervisor
Date: August 31, 2012

GENERAL INFORMATION

Hong Tian Tai (H.K.) Co., Ltd.
BRAND NAME: Jukebox Wizard, MODEL: 1648205
BRAND NAME: HOTT S040, MODEL: S040
FCC ID: P5Q1648205

Grantee:	Hong Tian Tai (H.K.) Co., Ltd.
Grantee Address:	Block6, Zone3, XinXing Industrial Park, XinHe Village, FuHai Avenue, FuYong Town, BaoAn District, ShenZhen, China.
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Manufacturer:	Hongfutai E-Tech (ShenZhen) Co., Limited
Manufacturer Address:	Block6, Zone3, XinXing Industrial Park, XinHe Village, FuHai Avenue, FuYong Town, BaoAn District, ShenZhen, China.
Brand Name:	Jukebox Wizard / HOTT S040
Model:	1648205 / S040
Type of EUT:	Transceiver
Description of EUT:	Bluetooth Speaker
Serial Number:	N/A
FCC ID:	P5Q1648205
Date of Sample Submitted:	July 20, 2012
Date of Test:	August 08, 2012
Report No.:	HK12070961-1
Report Date:	August 31, 2012
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

SUMMARY OF TEST RESULT

Hong Tian Tai (H.K.) Co., Ltd.
BRAND NAME: Jukebox Wizard, MODEL: 1648205
BRAND NAME: HOTT S040, MODEL: S040
FCC ID: P5Q1648205

TEST SPECIFICATION	REFERENCE	RESULTS
Maximum Peak Output Power	15.247(b), (c) / RSS-210 A8.4	N/A
Hopping Channel Carrier Frequencies Separation	15.247(e) / RSS-210 A8.1	N/A
20dB Bandwidth of the Hopping Channel	15.247(a) / RSS-210 A8.1	N/A
Number of Hopping Frequencies	15.247(e) / RSS-210 A8.1	N/A
Average Time of Occupancy of Hopping Frequency	15.247(e) / RSS-210 A8.1	N/A
Antenna Conducted Spurious Emissions	15.247(d) / RSS-210 A8.5	N/A
Radiated Spurious Emissions	15.247(d) / RSS-210 A8.5	N/A
RF Exposure Compliance	15.247(i) / RSS-Gen 5.6	N/A
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 7.2.4	Pass
Transmitter Field Strength	15.227 / RSS-310 3.8	N/A
Transmitter Field Strength	15.229 / RSS-210 A2.7	N/A
Transmitter Field Strength, Bandwidth and Timing Requirement	15.231(a) / RSS-210 A1.1.1	N/A
Transmitter Field Strength, Bandwidth and Timing Requirement	15.231(e) / RSS-210 A1.1.5	N/A
Transmitter Field Strength and Bandwidth Requirement	15.239 / RSS-210 A2.8	N/A
Transmitter Field Strength and Bandwidth Requirement	15.249 / RSS-210 A2.9	Pass
Transmitter Field Strength and Bandwidth Requirement	15.235 / RSS-310 3.9	N/A
Receiver / Digital Device Radiated Emissions	15.109 / RSS-210 2.5	N/A
Digital Device Conducted Emissions	15.107 / ICES-003	N/A

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.

Table of Contents

1.0 General Description

1.1 Product Description

The equipment under test (EUT) is a 2.4GHz RF transceiver (Bluetooth speaker) with auxiliary input port. The EUT is powered by one 3.7V rechargeable Li-Polymer battery. The EUT has an ON/OFF switch, three buttons and a port for charging only via a provided USB cable. When the EUT is switched on, the EUT can be linked with Bluetooth device via Bluetooth link, it can be received audio signal from the Bluetooth device and produce the audio through speaker.

The Model: S040 is the same as the Model: 1648205 in hardware aspect. The difference in model number and brand name 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.

The receiver for this transceiver is exempted from the Part 15 technical rules per 15.101(b).

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). All radiated measurements were performed in an Open Area Test Site. Preliminary scans were performed in the Open Area Test Site only 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.

1.4 Test Facility

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

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 1 x 3.7VDC Li-Polymer rechargeable battery.

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 3.0.

The unit was operated standalone / with computer system and placed in the center / rear of the turntable. Since the unit can transmit during charging mode, both standalone and charging with computer system are tested, and only worst case was presented in this test report.

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.

2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it transmits the RF signal continuously.

2.3 Special Accessories

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

2.4 Equipment Modification

Any modifications installed previous to testing by Hong Tian Tai (H.K.) Co., Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Hong Kong Ltd.

2.5 Measurement Uncertainty

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

2.6 Support Equipment List and Description

Lenovo Notebook (Model: SL500; S/N: ML-DXMM3) (Provided by Intertek)
Lenovo Notebook (Model: T61; S/N: L3-CF468) (Provided by Intertek)
iPod (EW2464) (Provided by Intertek)
Smart-Drive External 1394 HDD (Provided by Intertek)
1 x USB cable with length of 0.7m long (Provided by Intertek)
1 x 1394 cable with length of 0.8m long (Provided by Intertek)
1 x USB charging cable with length of 0.82m (Provided by Applicant)
1 x AUX In cable with length of 0.8m (Provided by Intertek)

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 27 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
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

RR = 18.0 dBµV
LF = 9.0 dB

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

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 2402.000 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 16.6 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 21.502 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 9.3 dB

Applicant: Hong Tian Tai (H.K.) Co., Ltd. Date of Test: August 08, 2012
Model: 1648205
Worst-Case Operating Mode: Transmitting

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	101.0	33	29.4	97.4	30.1	67.3	94.0	-26.7
H	4804.000	51.5	33	34.9	53.4	30.1	23.3	54.0	-30.7
H	7206.000	45.7	33	37.9	50.6	30.1	20.5	54.0	-33.5
H	9608.000	42.8	33	40.4	50.2	30.1	20.1	54.0	-33.9
H	12010.000	42.4	33	40.5	49.9	30.1	19.8	54.0	-34.2
H	14412.000	42.4	33	40.0	49.4	30.1	19.3	54.0	-34.7

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	101.0	33	29.4	97.4	114.0	-16.6
H	4804.000	51.5	33	34.9	53.4	74.0	-20.6
H	7206.000	45.7	33	37.9	50.6	74.0	-23.4
H	9608.000	42.8	33	40.4	50.2	74.0	-23.8
H	12010.000	42.4	33	40.5	49.9	74.0	-24.1
H	14412.000	42.4	33	40.0	49.4	74.0	-24.6

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.

Applicant: Hong Tian Tai (H.K.) Co., Ltd. Date of Test: August 08, 2012
Model: 1648205
Worst-Case Operating Mode: Transmitting

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	100.8	33	29.4	97.2	30.1	67.1	94.0	-26.9
H	4880.000	51.1	33	34.9	53.0	30.1	22.9	54.0	-31.1
H	7320.000	45.5	33	37.9	50.4	30.1	20.3	54.0	-33.7
H	9760.000	42.8	33	40.4	50.2	30.1	20.1	54.0	-33.9
H	12200.000	42.3	33	40.5	49.8	30.1	19.7	54.0	-34.3
H	14640.000	44.0	33	38.4	49.4	30.1	19.3	54.0	-34.7

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	2440.000	100.8	33	29.4	97.2	114.0	-16.8
H	4880.000	51.1	33	34.9	53.0	74.0	-21.0
H	7320.000	45.5	33	37.9	50.4	74.0	-23.6
H	9760.000	42.8	33	40.4	50.2	74.0	-23.8
H	12200.000	42.3	33	40.5	49.8	74.0	-24.2
H	14640.000	44.0	33	38.4	49.4	74.0	-24.6

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.

Applicant: Hong Tian Tai (H.K.) Co., Ltd. Date of Test: August 08, 2012
Model: 1648205
Worst-Case Operating Mode: Transmitting

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	100.3	33	29.4	96.7	30.1	66.6	94.0	-27.4
H	4960.000	50.9	33	34.9	52.8	30.1	22.7	54.0	-31.3
H	7440.000	45.7	33	37.9	50.6	30.1	20.5	54.0	-33.5
H	9920.000	42.9	33	40.4	50.3	30.1	20.2	54.0	-33.8
H	12400.000	41.9	33	40.5	49.4	30.1	19.3	54.0	-34.7
H	14880.000	43.9	33	38.4	49.3	30.1	19.2	54.0	-34.8

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	100.3	33	29.4	96.7	114.0	-17.3
H	4960.000	50.9	33	34.9	52.8	74.0	-21.2
H	7440.000	45.7	33	37.9	50.6	74.0	-23.4
H	9920.000	42.9	33	40.4	50.3	74.0	-23.7
H	12400.000	41.9	33	40.5	49.4	74.0	-24.6
H	14880.000	43.9	33	38.4	49.3	74.0	-24.7

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.

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.

8.0 Miscellaneous Information

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

8.1 Measured Bandwidth

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 (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).

8.2 Discussion Pulse Desensitivity

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 625μs for a digital “1” bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

8.3 Calculation of Average Factor

Based on the Bluetooth Specification Version 2.0 / 2.1 + 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 all 79 RF channels, it take: 79 x 3.75ms = 296.25ms.

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

Therefore,

Duty Cycle (DC) = Maximum On time in 100ms/100ms
= 3.125ms/100ms
= 0.03125

Average Factor (AF) of Bluetooth in dB = $20 \log_{10} (0.03125)$
= -30.1dB

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 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 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.

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 8.2). 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 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.

9.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2500	EW-2512	EW-0446
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI	3104C	3146
Calibration Date	Feb. 24, 2012	Nov. 15, 2011	Oct. 31, 2011
Calibration Due Date	Feb. 24, 2013	May 15, 2013	Apr. 30, 2013

Equipment	14m Double Shield RF Cable (20MHz - 6GHz)	14m Double Shield RF Cable (20MHz to 6GHz)	Spectrum Analyzer
Registration No.	EW-2528	EW-2074	EW-2188
Manufacturer	RADIALL	RADIALL	AGILENTTECH
Model No.	nm / br5d / sma 14m	N(m)-RG142-BNC(m) L= 14M	E4407B
Calibration Date	Nov. 29, 2011	Jan. 13, 2012	Sep. 26, 2011
Calibration Due Date	Dec. 14, 2012	Jan. 14, 2013	Sep. 26, 2012

2) Bandedge Measurement

Equipment	EMI Test Receiver
Registration No.	EW-2500
Manufacturer	ROHDESCHWARZ
Model No.	ESCI
Calibration Date	Feb. 24, 2011
Calibration Due Date	Feb. 24, 2013

3) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN	Pulse Limiter
Registration No.	EW-2500	EW-0192	EW-0698
Manufacturer	R&S	R&S	R&S
Model No.	ESCI	ESH3-Z5	ESH3-Z2
Calibration Date	Feb. 24, 2012	Apr. 11, 2012	Apr. 06, 2012
Calibration Due Date	Feb. 24, 2013	Apr. 11, 2013	Apr. 06, 2013