TEST REPORT

Report No.: HK09060999-1

BAO Limited

Application
For
Certification

(Original Grant)

(FCC ID: QWS8226V)

Transmitter

Prepared and Checked by:

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Date: July 28, 2009

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GENERAL INFORMATION

BAO Limited
MODEL: 8226

FCC ID: QWS8226V

Grantee:	BAO Limited
Grantee Address:	Rm. No. 603-609, 6/F., Office Bldg. West Wing, New World Ctr., No. 20 Salisbury Rd., Tsim Sha Tsui, Kowloon, Hong Kong.
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Manufacturer:	N/A
Manufacturer Address:	N/A
Brand Name:	N/A
Model:	8226
Type of EUT:	Transmitter
Description of EUT:	Smart Talking Truck
Serial Number:	N/A
FCC:	QWS8226V
Date of Sample Submitted:	June 18, 2009
Date of Test:	July 4, 2009
Report No.:	HK09060999-1
Report Date:	July 28, 2009
Environmental Conidtions:	Temperature: +10 to 40°C Humidity: 10 to 90%

SUMMARY OF TEST RESULT

BAO Limited
MODEL: 8226

FCC ID: QWS8226V

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
Anteann 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 5.5	N/A
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 7.2.2	N/A
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	N/A
Transmitter Field Strength and Bandwidth Requirement	15.225 / RSS-310 2.6	Pass
Receiver / Digital Device Radiated Eissions	15.109 / ICES-003	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 transmitter for an Inductive Toy operating at 13.56 MHz which is controlled by a crystal. The EUT includes a Truck and Four Cars with tag inside. The Truck is powered by four AA batteries, it has a power switch and five buttons. When the power switch is "ON", the biggest blue button is to generate the truck engine sound. When one of the remain buttons is pressed, the Truck will generate a RF engergy to the car where places on it. Then, the car will transmit a signal back to the Truck and Truck will generate various sound effect depend on the game mode selected. The detail is shown in the following. When the green button is pressed, the truck will count the number of cars where place on it and reports to the user. When the yellow button is pressed, the truck will generate various engine sound depend on the car places on it. When the blue button is pressed, the truck will instruct the user to park the assigned colour of car on it. When the red button is pressed, the truck will instruct the user to park the car on the parking ramp.

Antenna Type : Internal, Loop Antenna

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

1.2 Related Submittal(s) Grants

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

1.3 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.4 (2003). 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 (2003).

The device was powered from 4 new AA batteries during test.

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 emission at and above 30 MHz, 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 report in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

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 BAO Limited will be incorporated in each production model sold/leased in the United States.

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

N/A.

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

Worst Case Radiated Emission at 81.384 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 2.5 dB

Applicant: BAO Limited
Model: 8226
Mode: TX
Sample: 6/10

Date of Test: July 4, 2009

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBμV/m)	Distance Factor (-dB)	Calculated at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)
V	13.564	55.8	10.8	0.0	66.6	40.0	26.6	84.0	-57.4
V	27.128	26.5	9.5	0.0	36.0	40.0	-4.0	29.5	-33.5

Table 2

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	40.692	41.8	10	16.0	35.8	40.0	-4.2
V	54.256	42.0	11	16.0	37.0	40.0	-3.0
V	67.820	43.3	8	16.0	35.3	40.0	-4.7
H	81.384	46.5	7	16.0	37.5	40.0	-2.5
H	94.948	43.4	11	16.0	38.4	43.5	-5.1
H	108.512	37.9	14	16.0	35.9	43.5	-7.6
H	122.076	40.5	14	16.0	38.5	43.5	-5.0
H	135.640	41.0	14	16.0	39.0	43.5	-4.5
H	149.209	42.0	14	16.0	40.0	43.5	-3.5

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

5. Horn antenna is used for the emissions over 1000MHz.

Applicant: BAO Limited
Model: 8226
Mode: Sound
Sample: 6/10

Date of Test: July 4, 2009

Table 3

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	49.048	35.0	16	11.0	30.0	40.0	-10.0
V	52.816	37.1	16	11.0	32.1	40.0	-7.9
V	56.604	38.0	16	11.0	33.0	40.0	-7.0
V	60.352	35.9	16	10.0	29.9	40.0	-10.1
V	64.134	41.5	16	9.0	34.5	40.0	-5.5
V	67.912	40.5	16	8.0	32.5	40.0	-7.5
V	75.452	45.0	16	6.0	35.0	40.0	-5.0
H	116.936	30.0	16	14.0	28.0	43.5	-15.5
H	124.471	30.5	16	14.0	28.5	43.5	-15.0
H	150.886	35.4	16	14.0	33.4	43.5	-10.1
H	173.541	32.0	16	19.0	35.0	43.5	-8.5
H	188.641	38.5	16	16.0	38.5	43.5	-5.0

Notes: Negative signs (-) in the margin column signify levels below the limit.

3.4 Frequency Stability

FCC Part 15 Section 15.225(e)

Data Table
Frequency tolerance of Transmitter
(Temperature Variation : -20°C to +50°C)

Operating frequency			13.563681 MHz	
Test Voltage (V)	Temperature (°C)	Measured frequency (MHz)	Frequency shift (%)	Limit (%)
6	+50	13.563653	-0.000206	±0.01
	+40	13.563638	-0.000317	±0.01
	+30	13.563651	-0.000221	±0.01
	+20	13.563681	0	±0.01
	+10	13.563671	-0.000074	±0.01
	0	13.563647	-0.000251	±0.01
	-10	13.563623	-0.000428	±0.01
	-20	13.563585	-0.000708	±0.01

We found that the EUT met the requirement of FCC Part 15 Section 15.225(e).

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

This miscellaneous information includes details of the measured bandwidth.

8.1 Measured Bandwidth

The plot saved in bw.pdf which shows the fundamental emission is confined in the specified band. The emission of the fundamental is 26.6 dBµV/m and it is below the limit of 50.5 dBµV/m in the range of (13.410 – 13.553 MHz) and (13.567 - 13.710 MHz) and the limit of 40.5 dBµV/m in the frequency range of (13.110 – 13.410 MHz) and (13.710 – 14.010 MHz). In the frequency range from 13.110 – 14.010 MHz, we cannot find any emission higher than the fundamental emission. Therefore they meet the requirement of Section 15.225(a), (b), (c), & (d).

8.2 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 - 2003.

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

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 - 2003.

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

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

9.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna	Active H-field Loop Antenna
Registration No.	EW-0016	EW-0954	EW-0446	EW-0191
Manufacturer	R&S	EMCO	EMCO	EMCO
Model No.	ESVS30	3104C	3146	6502
Calibration Date	Apr. 14, 2009	Sep. 30, 2008	Oct. 02, 2008	Jun. 26, 2008
Calibration Due Date	Apr. 14, 2010	Mar. 30, 2010	Apr. 02, 2010	Dec. 26, 2010

Equipment	Spectrum Analyzer	Double Ridged Guide Antenna	Double Ridged Guide Antenna
Registration No.	EW-2188	EW-0194	EW-1015
Manufacturer	AGILENTTECH	EMCO	EMCO
Model No.	E4407B	3160-09	3115
Calibration Date	Dec. 18, 2008	Dec. 24, 2008	Jul. 28, 2008
Calibration Due Date	Dec. 18, 2009	Jun. 24, 2010	Jan. 28, 2010

Equipment	Temperature & Humidity Chamber	Frequency Counter
Registration No.	EW-2134	EW-2288
Manufacturer	GIANT FORCE	Agilent
Model No.	GTH-750-40-CP-SD	53181A
Calibration Date	Sep. 04, 2008	Jul. 29, 2008
Calibration Due Date	Aug. 29, 2009	Jul. 29, 2009