Aleph Electronics (Shenzhen) CO., LTD.

Application
For
Certification

FCC ID: 2ABRNOK-1

Beer Keg Weight Sensor

Model: OK-01

13.56MHz Transmitter

Report No.: 140121012SZN-001

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-13]

Prepared and Checked by:	Approved by:
Sign on file	Digitally signed by Billy Li Location: Intertek Testing Services
Harry Wu Engineer	Billy Li Supervisor Date: February 27, 2014

TRF No.: FCC 15C_TX_b

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GENERAL INFORMATION

Aleph Electronics (Shenzhen) CO., LTD.
Model: OK-01

Grantee:	Aleph Electronics (Shenzhen) CO., LTD.
Grantee Address:	A20 Hengfeng Industrial City, Hezhou, Baoan Qu, Shenzhen, China
Contact Person:	Ryan Lu
Tel:	86-0755-27325533-1039
Manufacturer:	Aleph Electronics (Shenzhen) CO., LTD.
Manufacturer Address:	A20 Hengfeng Industrial City, Hezhou, Baoan Qu, Shenzhen, China
Model:	OK-01
Trademark:	ALEPH
FCC ID:	2ABRNOK-1
Type of EUT:	13.56MHz Transmitter
Description of EUT:	Beer Keg Weight Sensor
Date of Sample Submitted:	December 4, 2013
Date of Test:	January 11, 2014
Report No.:	140121012SZN-001
Report Date:	February 27, 2014
Normal Environmental Conidtions:	Temperature: +10 to 40°C Humidity: 10 to 90%

SUMMARY OF TEST RESULT

Aleph Electronics (Shenzhen) CO., LTD.
Model: OK-01

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	15.225 / RSS-210 A2.6	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	N/A
Transmitter Field Strength and Bandwidth Requirement	15.235 / RSS-310 3.9	N/A
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 an integral 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 a Beer Keg Weight Sensor model: OK-01 operating at 13.56 MHz. The EUT is powered by a 3.6V Lithium battery. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna

Type of modulation: Pulse modulation

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

1.2 Related Submittal(s) Grants

This is is an application for certification of the RF ID function. And the Zigbee function is subjected to FCC certification with Report No. 140121012SZN-002.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated Emission measurement was performed in a Semi-anechoic chamber. Preliminary scans were performed in the Semi-anechoic chamber only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. 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 Semi-anechoic chamber facility used to collect the radiated data is Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

2.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The EUT was powered by a fully 3.6V Lithium battery 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 centre 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 can transmit 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 Aleph Electronics (Shenzhen) CO., LTD. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd Kejiyuan Branch.

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
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

3.2 Radiated Emission Configuration Photograph

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

3.3 Radiated Emission Data

Worst Case Radiated Emission at 40.680 MHz

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 14.5 dB

Applicant: Aleph Electronics (Shenzhen) CO., LTD.
Date of test: January 11, 2014
Model: OK-01
Test Mode: Transmit

Table 1

Fundamental & Harmonic frequency Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Vertical	13.560	55.6	0.0	10.8	66.4	124.0	-57.6
Vertical	27.120	36.1	20.0	9.5	25.6	69.5	-43.9

Table 2

Spurious emission

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	30.485	25.1	20.0	16.8	21.9	40.0	-18.1
Horizontal	162.420	21.9	20.0	20.8	22.7	43.5	-20.8
Horizontal	257.465	20.6	20.0	22.7	23.3	46.0	-22.7
Vertical	40.680	34.8	20.0	10.7	25.5	40.0	-14.5
Vertical	81.410	32.9	20.0	5.8	18.7	40.0	-21.3
Vertical	542.645	32.2	20.0	17.4	29.6	46.0	-16.4

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.

3.4 Frequency Stability

Procedure: 15.225(e), ANSI C63.4:2009

If required, the operating or transmitting frequency of an intentional radiator should be measured in accordance with the following procedure to ensure that the device operates outside certain precluded frequency bands and within the frequency range. No modulation needs to be supplied to the intentional radiator during these tests, unless modulation is required to produce an output, e.g., single-sideband suppressed carrier transmitters.

The frequency stability of the transmitter is measured by:

a) Temperature: The temperature is varied from -20°C to + 50°C using an environmental chamber.

b) For battery operated equipment, the equipment tests shall be performed using a new battery.

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

Measurement Result:

Voltage (%)	Power	Temperature (°C)	Frequency (MHz)	Frequency Error (%)	Limit (%)
100	3.6V	-20	13.560261	0.00192	±0.01
		-10	13.560135	0.00100	
		0	13.560160	0.00118	
		10	13.560290	0.00214	
		20	13.559994	-0.00004	
		30	13.560348	0.00257	
		40	13.560100	0.00074	
		50	13.560129	0.00095	

Note: The EUT is supplied with the fully Lithium battery.

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 of bandwidth which shows the fundamental emission is confined in the specified band. The emission of the fundamental is 66.4dBuV/m and it is below the limit of 90.5dBuV/m in the range of (13.410-13.553MHz and 13.567-13.710MHz) and the limit of 80.5dBuV/m in the frequency range of (13.110-13.410MHz and 13.710-14.010MHz). We cannot find any emission higher than the fundamental emission. Therefore they meet the requirement of Section 15.225(a), (b), (c).

A plot of the worst-case bandwidth as detected in this manner is saved with filename: bw.pdf. And it also shows that the emission is at least 28.57 dB below the carrier level at the band edge (13.110–14.010 MHz). It meets the requirement of Section 15.225 (d).

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

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 - 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 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.

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.

8.2 Emissions Test Procedures (cont'd)

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

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

Conducted measurements are made as described in ANSI C63.4 - 2009.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2).

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

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	29-Jun-13	29-Jun-14
SZ185-01	EMI Receiver	R&S	ESCI	100547	12-Mar-13	12-Mar-14
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2-Mar-13	2-Mar-14
SZ062-04	RF Cable	RADIALL	RG 213U	--	20-Jul-13	20-Jan-14
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	--	14-Jul-13	14-Jan-14
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	17-Oct-13	17-Apr-14
SZ016-12	Temperature and Humidity Chamber	TERCHY	MHK-120NK	--	12-Mar-13	12-Mar-14