FCC PART 15.231

TEST AND MEASUREMENT REPORT

For

South Pacific Electronics

P.O. Box 9417, Nadi Airport, Fiji Islands

FCC ID: OHKFOB433

Report Type:	**Product Type:**
Original Report	Keyring Remote Control

Prepared By:	Chin Ming Lui Test Engineer
Report Number:	R1712042-231
Report Date:	2018-03-07
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1712042-231	Original Report	2018-01-30
1	R1712042-231	Report Revision + DoS	2018-02-14
2	R1712042-231	Updated page 18, 19, 20	2018-03-07

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *South Pacific Electronics*, and their product, model: *FOB43301, FOB43301L, FOB43302, FOB43304, FOB43305. South Pacific Electronics* has declared that the 5 products are electrically identical with the same electromagnetic emissions and electromagnetic compatibility. In this report, only *FOB43305* was tested to cover the other corresponding models. Henceforth is referred to as the EUT. The EUT is a keyring remote control and operating from 433.16MHz to 434.6MHz.

1.2 Mechanical Description of EUT

The "EUT" measures approximately *6cm (L) x 3.8cm (W) x 1cm (H)*, and weighs approximately *0.029k*g.

1.3 Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.10-2013.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 º C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Annex B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3279.02)*****,** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.03)*** to certify

- For the USA (Federal Communications Commission):
  1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  2 All Scope 2-Licensed Personal Mobile Radio Services;
  3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  5 All Scope 5-Licensed Fixed Microwave Radio Services
  6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2

- For the Hong Kong Special Administrative Region:
    1 All Radio Equipment, per KHCA 10XX-series Specifications;
    2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
    3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
    1 MIC Telecommunication Business Law (Terminal Equipment):
        - All Scope A1 - Terminal Equipment for the Purpose of Calls;
        - All Scope A2 - Other Terminal Equipment
    2 Radio Law (Radio Equipment):
        - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
        - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
        - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):

  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC US -EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured in testing mode which was provided by manufacturer.

2.2 EUT Exercise Software

No software was used for testing.

2.3 Equipment Modifications

Samples with modified firmware were provided along with the production sample with normal operating firmware. The modified firmware will enable the EUT to transmit continuously at low, middle, and high channel for 20 minutes.

2.4 Local Support Equipment

N/A

2.5 Interface Ports and Cabling

N/A

2.6 External I/O Cabling List and AC Cord

N/A

2.7 Power Supply List and Details

N/A

3 Summary of Test Results

Results reported relate only to the product tested.

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conduction Emissions	N/A
§15.231 (a)	Periodic Transmission	Compliant
§15.205, §15.209, §15.231 (b)	Radiated Emissions	Compliant
§15.231 (c)	Emission Bandwidth	Compliant

N/A: EUT is battery powered.

4 FCC §15.203 - Antenna Requirements

4.1 Applicable Standards

According to FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 Antenna Description

The EUT has one internal antenna which was permanently attached.

Antenna Type	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
PCB trace antenna	430-440	-2

5 FCC §15.231 (a) – Deactivation Testing

5.1 Applicable Standard

According to FCC §15.231 (a) (1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

5.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument via radiated horn antenna. Then set it to any one convenient frequency within its operating range.
3. Set span to zero and record.
4. Repeat above procedures until all frequencies measured were complete.

5.3 Test Equipment List and Details

Manufacturers	Description	Model No.	Serial No.	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2017-04-20	1 Year
EMCO	Horn Antenna	3115	9511-4627	2016-01-28	2 Years

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

5.4 Test Environmental Conditions

Temperature:	23.3 °C
Relative Humidity:	59 %
ATM Pressure:	101.1 kPa

The testing was performed by Chin Ming Lui on 2017-12-15 at RF Bench Site.

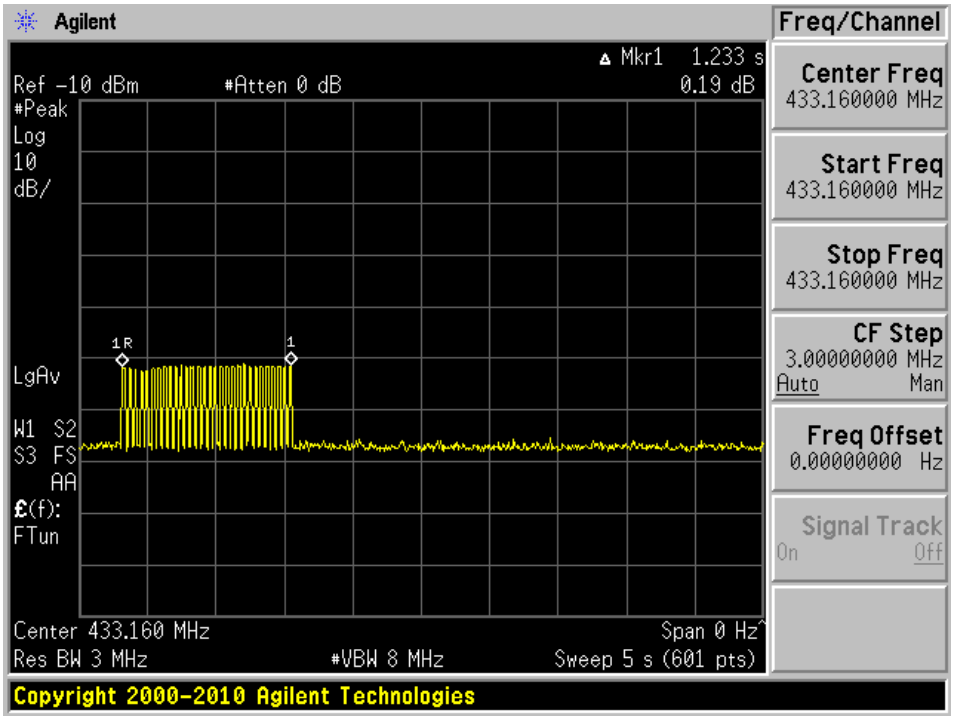
5.5 Test Results

Please refer to the following table and plots for detailed test results

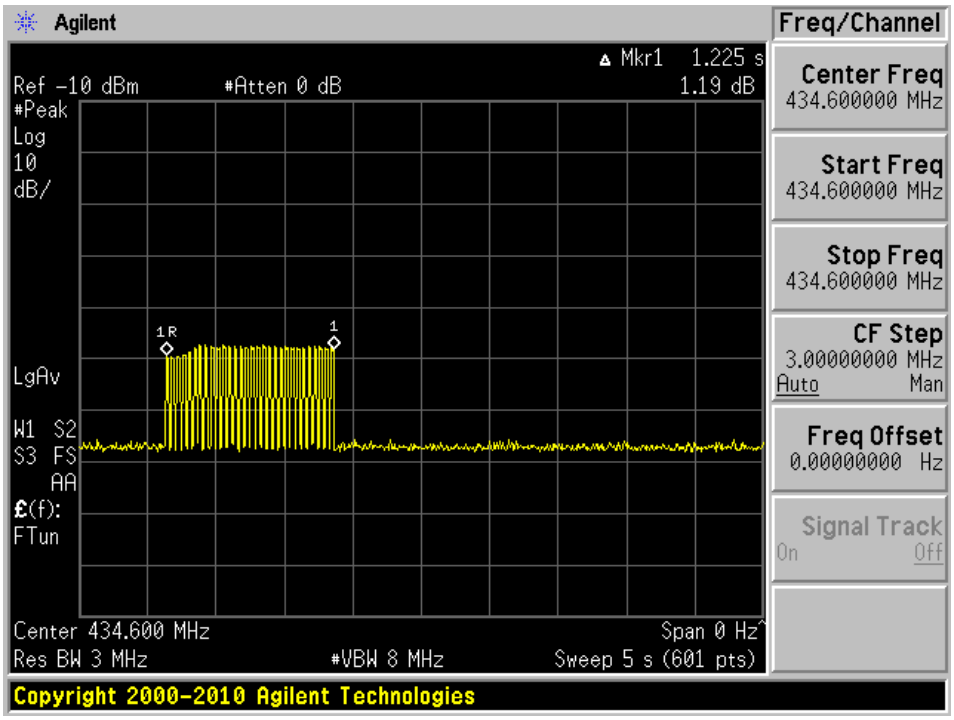
F_c (MHz)	Deactivation Time (s)	Limit (s)	Result
433.160	1.233	<5.0	Pass
434.600	1.225	<5.0	Pass

Note: this testing was performed on the production samples in normal operating mode.

Low Channel, 433.160 MHz



High Channel, 434.600 MHz



6 FCC §15.205, §15.209 & §15.231 (b) - Radiated Emissions

6.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4.5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5.35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3332 – 3339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3345.8 – 3358	23.6 – 24.0
12.29 – 12.293	240 – 285	3600 – 4400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As Per FCC §15.231(b), In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70 MHz	2250	225
70-130 MHz	1250	125
130-174 MHz	1250 to 3750[1]	125-375[1]
174-260 MHz	3750	375
260-470 MHz	3750 to 12500[1]	375 to 1250[1]
Above 470 MHz	12500	1250

Note 1: Linear Interpolations.

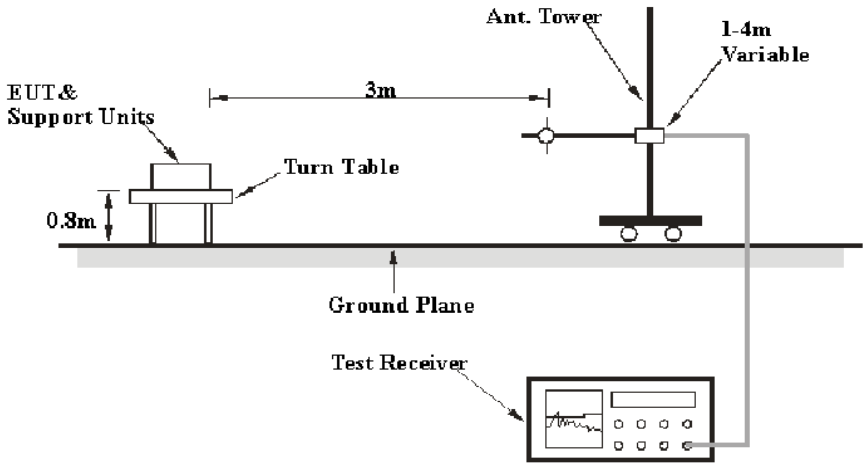
(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

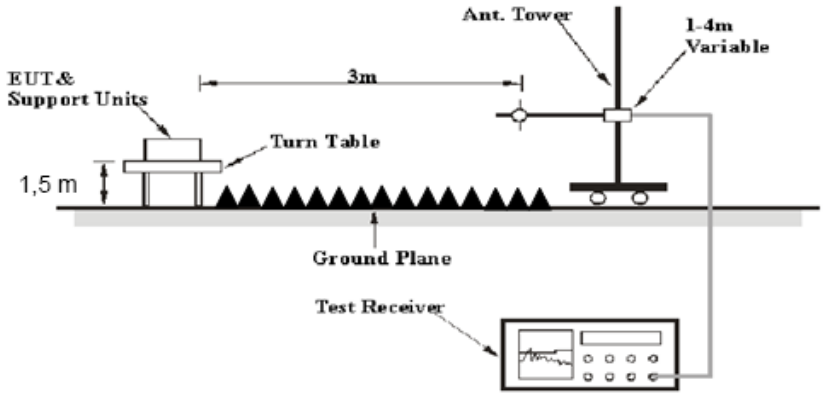
(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

6.2 Test Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

6.3 Test Procedure

For the radiated emissions test, the EUT was performed using a DC power supply.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meters away from the testing antenna, which is varied from 1-4 meters, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz, VBW = 300 kHz, Sweep = 100 ms

Above 1000 MHz:

(1) Peak: RBW = 1 MHz, VBW = 3 MHz, Sweep = 100 ms
(2) Average: RBW = 1 MHz, VBW = 10 Hz (if duty cycle ≥ 98%), VBW = $1/T_{per}$ (if duty cycle < 98%), Sweep = Auto

6.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, the Corrected Amplitude (CA) of 40.3 dBuV/m = indicated Amplitude reading (Ai) 32.5 dBuV + Antenna Factor (AF) 23.5dB + Cable Loss (CL) 3.7 dB + Attenuator (Atten) 10 dB - Amplifier Gain (Ga) 29.4 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBuV/m) - Limit (dBuV/m)

6.5 Test Equipment List and Details

Manufacturers	Descriptions	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US45303156	2017-02-24	1 Year
Sunol Sciences	Horn Antenna	DRH-118	A052704	2017-03-27	2 Years
Mini-Circuits	High-Pass Filter	-	-	-	-
Sunol Sciences	Biconi-Log Antenna	JB1	A013105-3	2015-07-11	30 Months
HP	Pre-amplifier	8447D	2944A07030	2017-05-17	1 Year
HP	Pre-amplifier	8449B	3147A00400	2017-06-15	1 Year
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/A
-	SMA cable	-	-	Each time[1]	N/A

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

6.6 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	48 %
ATM Pressure:	101.2 kPa

The testing was performed by Chin Ming Lui on 2017-12-18 and 2017-12-19 in 5m chamber 3.

6.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the limits presented in FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.231, and had the worst margin of:

Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Comments
-1.76	869.2	Horizontal	Average Measurement

6.8 Radiated Emissions Test Plot & Data

Low Channel, 433.160 MHz

Field Strength – Peak

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC §15.231(b)	
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
Low Channel 433.160 MHz										
433.16	59.52	0	100	H	22.31	0.85	0.00	82.68	100.80	-18.12
433.16	44.65	70	120	V	22.31	0.85	0.00	67.81	100.80	-32.99
866.32	66.63	61	100	H	27.92	1.23	29.71	66.07	80.80	-14.73
866.32	55.09	165	186	V	27.92	1.23	29.71	54.53	80.80	-26.27
1299.48	66.97	150	278	H	24.92	2.83	37.611	57.10	80.80	-23.70
1299.48	59.63	240	271	V	25.04	2.83	37.611	49.89	80.80	-30.91
1732.64	61.64	258	233	H	27.15	3.347	36.867	55.27	80.80	-25.53
1732.64	54.34	82	282	V	27.38	3.347	36.867	48.20	80.80	-32.60
2165.8	55.56	174	249	H	27.84	3.86	36.661	50.60	80.80	-30.20
2165.8	52.48	224	277	V	27.80	3.86	36.661	47.48	80.80	-33.32
2598.96	55.02	330	255	H	29.43	4.34	36.599	52.19	80.80	-28.61
2598.96	50.58	225	290	V	29.33	4.34	36.599	47.65	80.80	-33.15
3032.12	50.60	182	150	H	30.44	4.79	36.722	49.11	80.80	-31.69
3032.12	48.92	93	268	V	30.41	4.79	36.722	47.40	80.80	-33.40
3465.28	49.56	323	100	H	31.54	5.25	36.659	49.69	80.80	-31.11
3465.28	47.11	110	100	V	31.45	5.25	36.659	47.15	80.80	-33.65
3898.44	48.22	270	100	H	32.98	5.63	36.195	50.63	74.00	-23.37
3898.44	46.76	185	100	V	32.99	5.63	36.195	49.18	74.00	-24.82
4331.6	47.09	270	165	H	32.14	6.08	36.197	49.11	74.00	-24.89
4331.6	45.78	30	270	V	32.11	6.08	36.197	47.77	74.00	-26.23

Field Strength – Average

Frequency (MHz)	Peak Measurement @ 3m (dBµV/m)	Ant Polar (H/V)	Duty Cycle Correction Factor (dB)	Average Amp. (dBµV/m)	FCC §15.231(b)	
					Limit (dBµV/m)	Margin (dB)
Operating Frequency: 433.160 MHz						
433.16	82.68	H	-8.04	74.64	80.80	-6.16
433.16	67.81	V	-8.04	59.77	80.80	-21.03
866.32	66.07	H	-8.04	58.03	60.80	-2.77
866.32	54.53	V	-8.04	46.49	60.80	-14.31
1299.48	57.10	H	-8.04	49.06	60.80	-11.74
1299.48	49.89	V	-8.04	41.85	60.80	-18.95
1732.64	55.27	H	-8.04	47.23	60.80	-13.57
1732.64	48.20	V	-8.04	40.16	60.80	-20.64
2165.8	50.60	H	-8.04	42.56	60.80	-18.24
2165.8	47.48	V	-8.04	39.44	60.80	-21.36
2598.96	52.19	H	-8.04	44.15	60.80	-16.65
2598.96	47.65	V	-8.04	39.61	60.80	-21.19
3032.12	49.11	H	-8.04	41.07	60.80	-19.73
3032.12	47.40	V	-8.04	39.36	60.80	-21.44
3465.28	49.69	H	-8.04	41.65	60.80	-19.15
3465.28	47.15	V	-8.04	39.11	60.80	-21.69
3898.44	50.63	H	-8.04	42.59	54.00	-11.41
3898.44	49.18	V	-8.04	41.14	54.00	-12.86
4331.6	49.11	H	-8.04	41.07	54.00	-12.93
4331.6	47.77	V	-8.04	39.73	54.00	-14.27

High Channel, 434.600 MHz

Field Strength – Peak

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC §15.231(b)	
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
High Channel 434.600 MHz										
434.6	58.98	0	100	H	22.34	0.85	0.00	82.17	100.85	-18.68
434.6	43.82	78	100	V	22.34	0.85	0.00	67.01	100.85	-33.84
869.2	67.73	110	100	H	27.88	1.23	29.71	67.13	80.85	-13.72
869.2	57.07	162	168	V	27.88	1.23	29.71	56.47	80.85	-24.38
1303.8	66.10	160	279	H	24.92	2.916	37.611	56.32	74.00	-17.68
1303.8	61.88	235	261	V	25.04	2.916	37.611	52.22	74.00	-21.78
1738.4	59.64	255	300	H	27.15	3.347	36.867	53.27	80.85	-27.58
1738.4	52.31	244	300	V	27.38	3.347	36.867	46.17	80.85	-34.68
2173	54.17	155	253	H	27.84	3.86	36.661	49.21	80.85	-31.64
2173	50.98	295	276	H	27.80	3.86	36.661	45.98	80.85	-34.87
2607.6	53.41	330	230	V	29.43	4.34	36.599	50.58	80.85	-30.27
2607.6	49.71	170	300	V	29.33	4.34	36.599	46.78	80.85	-34.07
3042.2	50.93	170	300	H	30.44	4.79	36.722	49.44	80.85	-31.41
3042.2	47.29	250	100	V	30.41	4.79	36.722	45.77	80.85	-35.08
3476.8	49.04	50	267	H	31.55	5.25	36.659	49.18	80.85	-31.67
3476.8	47.29	245	100	V	31.57	5.25	36.659	47.45	80.85	-33.40
3911.4	47.85	330	100	H	32.98	5.72	36.195	50.35	74.00	-23.65
3911.4	46.12	155	100	H	32.99	5.72	36.195	48.63	74.00	-25.37
4346	47.53	330	300	V	32.14	6.08	36.197	49.55	74.00	-24.45
4346	45.73	120	300	V	32.11	6.08	36.197	47.72	74.00	-26.28

Field Strength – Average

Frequency (MHz)	Peak Measurement @ 3m (dBµV/m)	Ant Polar (H/V)	Duty Cycle Correction Factor (dB)	Average Amp. (dBµV/m)	FCC §15.231(b)	
					Limit (dBµV/m)	Margin (dB)
Operating Frequency: 434.600 MHz						
434.6	82.17	H	-8.04	74.13	80.85	-6.72
434.6	67.01	V	-8.04	58.97	80.85	-21.88
869.2	67.13	H	-8.04	59.09	60.85	-1.76
869.2	56.47	V	-8.04	48.43	60.85	-12.42
1303.8	56.32	H	-8.04	48.28	54.00	-5.72
1303.8	52.22	V	-8.04	44.18	54.00	-9.82
1738.4	53.27	H	-8.04	45.23	60.85	-15.62
1738.4	46.17	V	-8.04	38.13	60.85	-22.72
2173	49.21	H	-8.04	41.17	60.85	-19.68
2173	45.98	H	-8.04	37.94	60.85	-22.91
2607.6	50.58	V	-8.04	42.54	60.85	-18.31
2607.6	46.78	V	-8.04	38.74	60.85	-22.11
3042.2	49.44	H	-8.04	41.40	60.85	-19.45
3042.2	45.77	V	-8.04	37.73	60.85	-23.12
3476.8	49.18	H	-8.04	41.14	60.85	-19.71
3476.8	47.45	V	-8.04	39.41	60.85	-21.44
3911.4	50.35	H	-8.04	42.31	54.00	-11.69
3911.4	48.63	H	-8.04	40.59	54.00	-13.41
4346	49.55	V	-8.04	41.51	54.00	-12.49
4346	47.72	V	-8.04	39.68	54.00	-14.32

Duty Cycle：

T_{ON} (ms)	T_{Period} (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
16.67	42.08	39.62	-8.04

Note:

Calculate Average value based on duty cycle correction factor:

Duty cycle = $T_{ON}/T_{Period} \times 100\%$

= (16.67/42.08) × 100%

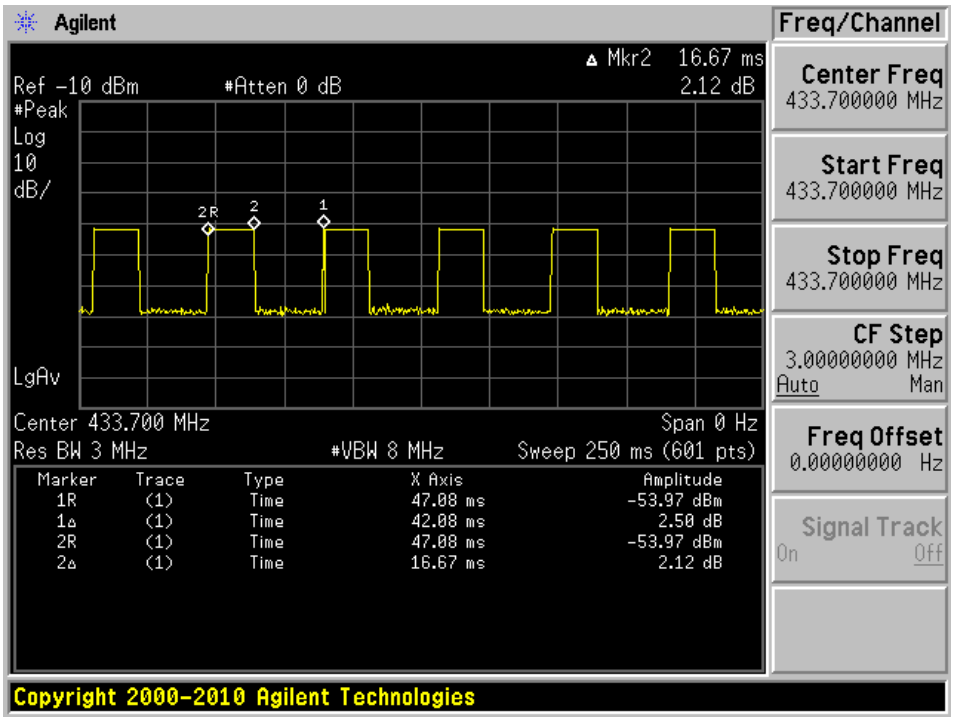
= 39.62%

Duty cycle correction factor = 20*log (duty cycle) = -8.04 dB

Average= Peak+ Duty cycle correction factor

Please refer to following plot.

Duty Cycle



7 FCC §15.231 (c) - Emission Bandwidth

7.1 Applicable Standard

FCC §15.231(c)

(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument via radiated horn antenna. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emissions bandwidth. (20 dB bandwidth for DTS)
4. Repeat above procedures until all frequencies measured were complete.

7.3 Test Equipment List and Details

Manufacturers	Description	Model No.	Serial No.	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2017-04-20	1 Year
EMCO	Horn Antenna	3115	9511-4627	2016-01-28	2 Years
-	Coaxial Cable	-	-	-	-

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

7.4 Test Environmental Conditions

Temperature:	23.3 °C
Relative Humidity:	59 %
ATM Pressure:	101.1 kPa

The testing was performed by Chin Ming Lui on 2017-12-15 at RF Bench Site.

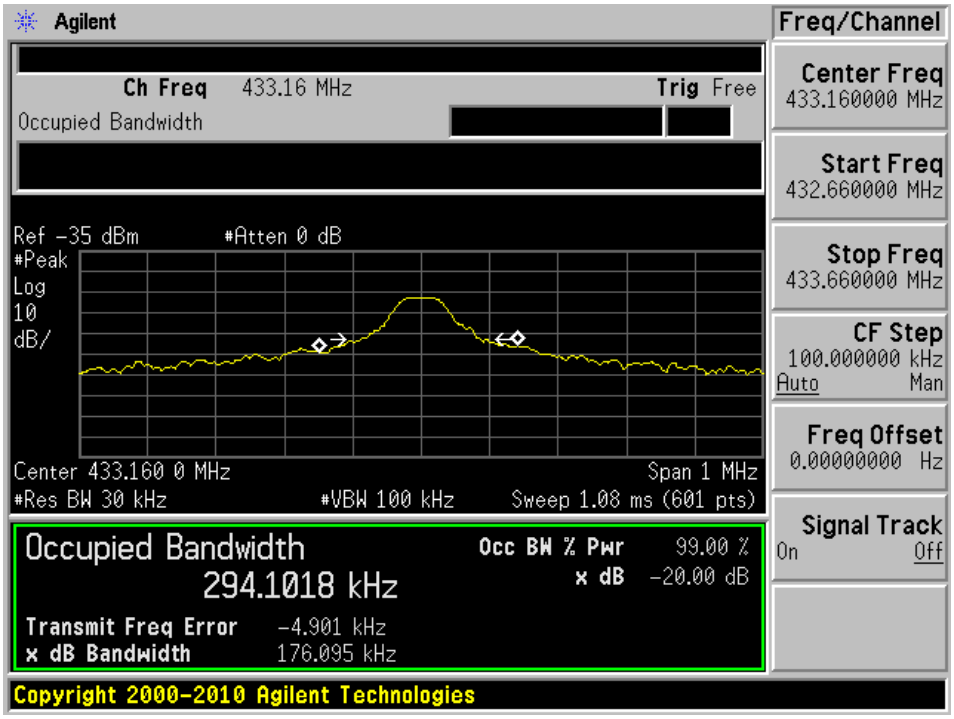
7.5 Test Results

433.160 MHz FCC Limit = Fundamental Frequency × 0.25% = 433.160 MHz × 0.25%= 1082.9 kHz
434.600 MHz FCC Limit = Fundamental Frequency × 0.25% = 434.600 MHz × 0.25%= 1086.5 kHz

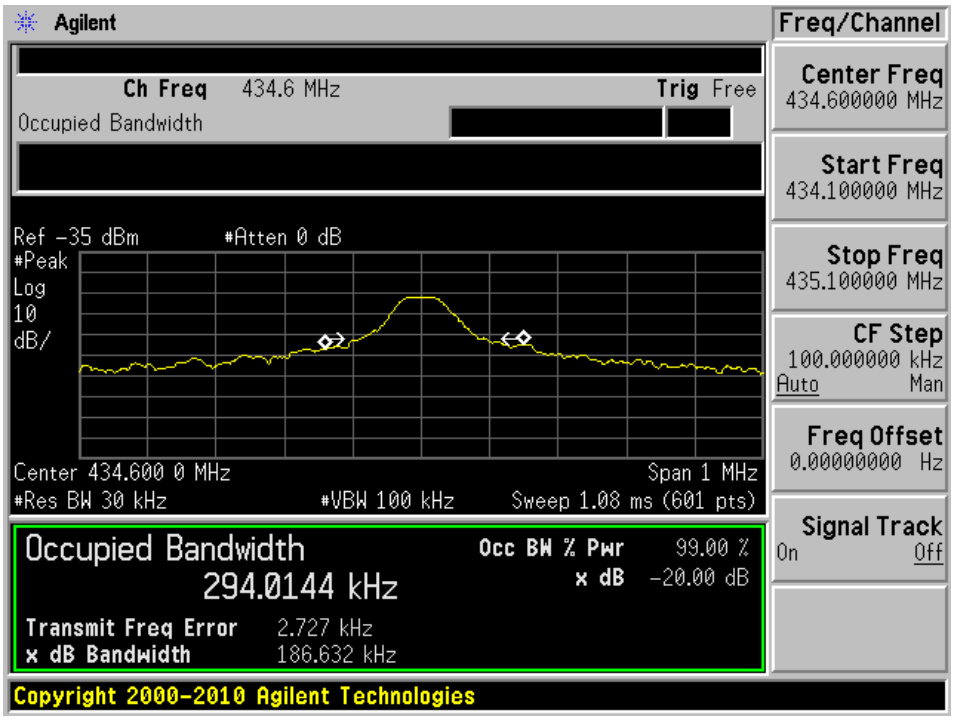
Channel Frequency (MHz)	FCC Result		
	20 dB Bandwidth (kHz)	Limit (kHz)	Result
433.160	176.095	1082.9	Compliant
434.600	186.632	1086.5	Compliant

Please refer to the following plots for detailed test results

Low Channel, 433.160 MHz



High Channel, 434.600 MHz



8 Exhibit A - FCC Equipment Labeling Requirements

8.1 FCC ID Label Requirements

As per FCC §2.925,

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term FCC ID in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID: XXX123

Where: XXX—Grantee Code 123—Equipment Product Code

As per FCC §15.19,

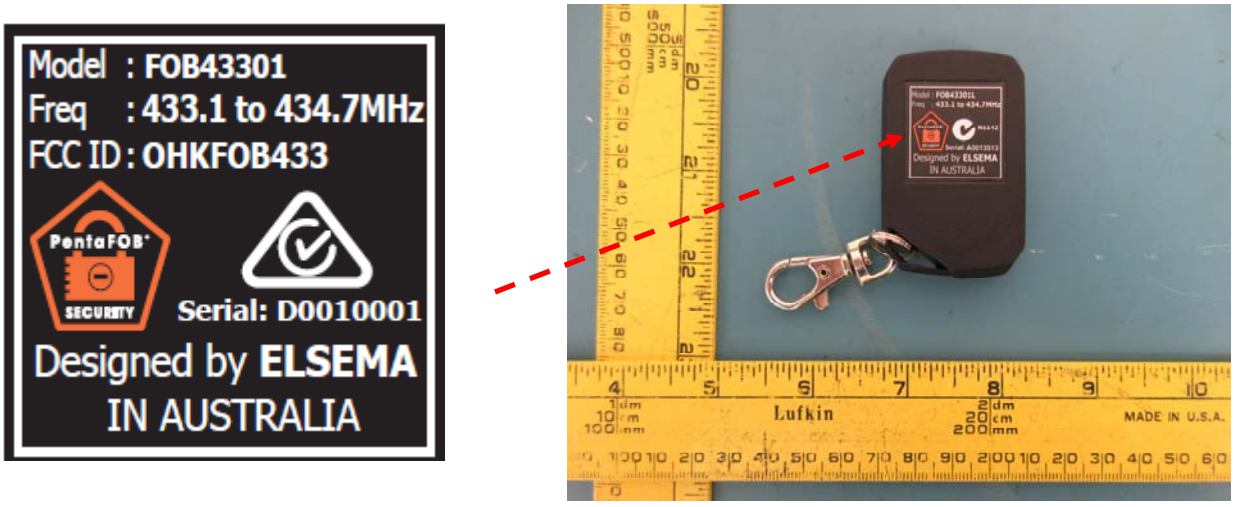
(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

(3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit. If the EUT is integrated within another device then a label affixed to the host shall also state, "Contains FCC ID: XXXXXX"

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

8.2 FCC ID Label Content and Location



8 Appendix

Please see attachments:

Exhibit B – EUT Test Setup Photographs
Exhibit C – EUT External Photographs
Exhibit D – EUT Internal Photographs

9 Annex A (Informative) - Declaration of Similarity

DECLARATION OF SIMILARITY

February 26, 2018

To:
Bay Area Compliance Laboratories Corp.
1274 Anvilwood Ave.
Sunnyvale, CA 94089
Phone: 408-732-9162, Fax: 408-732-9164
http://www.baclcorp.com

Dear Sir or Madam:

We *South Pacific Electronics* hereby declare that product: *Key ring FOB Transmitter,* model(s): *FOB43301, FOB43301L, FOB43302 and FOB43304* are electrically identical with the same electromagnetic emissions and electromagnetic compatibility characteristics as model: *FOB43305 tested by BACL* tested by BACL, the results of which are featured in BACL project: *R1712042.*

A description of the differences between the tested model and those that are declared similar are as follows:

The difference is the front button configurations Different button configurations will have the same radio characteristics.

Please contact me should there be need for any additional clarification or information.

Best Regards,

Richard Eigner
Director
Haji Street, Martintar, Nadi,
Fiji Islands

BACL-NF0028-A

First Electronic Manufacturing Company in the South Pacific

10 Annex B (Informative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of A2LA *R222 - Specific Requirements - EPA ENERGY STAR Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 30th day of August 2016.

Senior Director of Quality & Communications
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2018

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

--- END OF REPORT ---