

NORTHWEST EMC

FAIRWAYiQ

FAIRWAYiQ Smart Tag, Model FIQ-01

FCC 2.1091:2016
902-928 MHz Transceiver

Report # RIGA0008.1 Rev. 1



NVLAP Lab Code: 200630-0

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CERTIFICATE OF EVALUATION



Last Date of Evaluation: June 9, 2016
FAIRWAYiQ
Model: FAIRWAYiQ Smart Tag, Model FIQ-01

Radio Equipment Evaluation

Standards

Specification	Method
FCC 2.1091:2016	FCC 447498 D01 General RF Exposure Guidance v06

Results

Method Clause	Test Description	Applied	Results	Comments
7.2	Maximum Permissible Exposure	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Donald Facteau, IT Manager

Product compliance is the responsibility of the client; therefore, the evaluations and equipment modes of operation represented in this report were agreed upon by the client, prior to evaluation. The results of this evaluation pertain only to the sample(s) evaluated. The specific description is noted in each of the individual sections of the evaluation report supporting this certificate of evaluation. This report reflects only those evaluations from the referenced standards shown in the certificate of evaluation. It does not include inspection or verification of labels, identification, marking or user information.

REVISION HISTORY

Revision Number	Description	Date	Page Number
01	Updated this report to show two radios transmitting simultaneously	7-21-16	6, 9

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

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European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

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Korea

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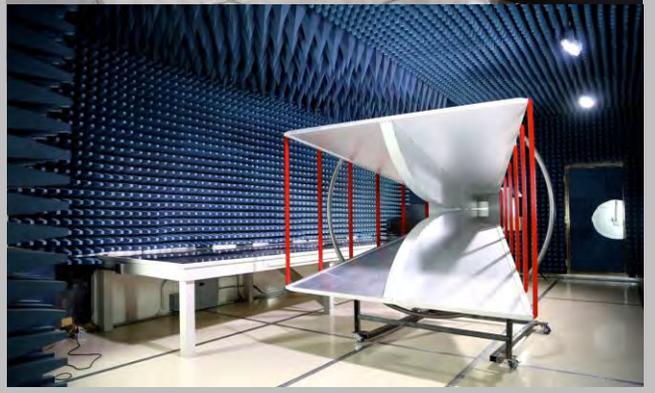
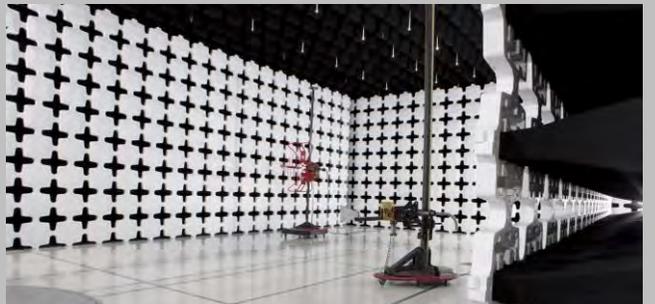
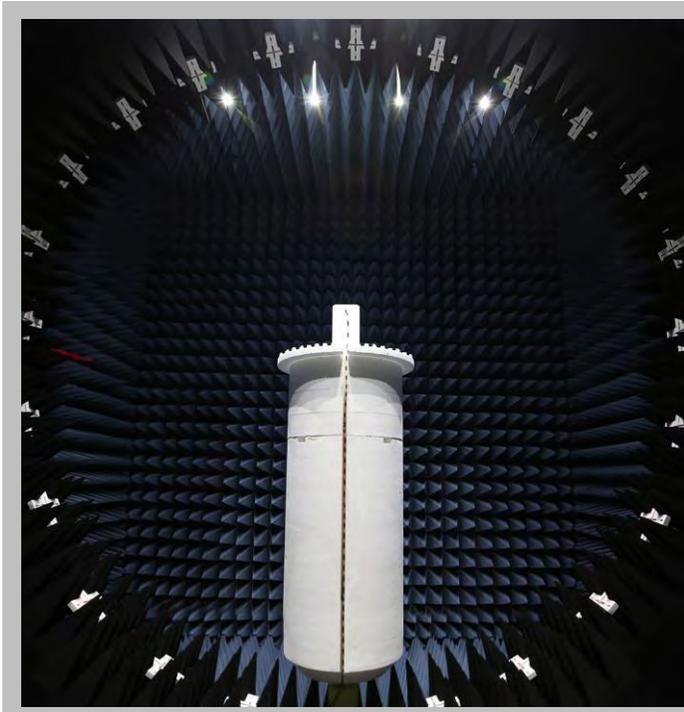
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FACILITIES



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NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157



PRODUCT DESCRIPTION

Client and Equipment Under Evaluation (EUT) Information

Company Name:	FAIRWAYiQ
Address:	300 Bear Hill Rd
City, State, Zip:	Waltham, MA 02451
Evaluation Requested By:	Mark Bielman of Rigado LLC
Model:	FAIRWAYiQ Smart Tag, Model FIQ-01
First Date of Evaluation:	June 9, 2016

Information Provided by the Party Requesting the Evaluation

Functional Description of the EUT:

Two radio device that is used on a golf course for tracking golfer positions on the course. These are co-located with the Bluetooth Low Energy radio module (FCC ID: 2AA9B03). The units are designed to be attached to the golf bag. Units are turned ON by a BLE beacon. The units use GPS for location to a centrally located Gateway using a LoRa 900 mHz radio.

Objective:

To demonstrate compliance with FCC requirements for RF exposure for 2.1091 mobile devices.

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

OVERVIEW

Human exposure to RF emissions from mobile devices (47 CFR §2.1091) may be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and/or power density, as appropriate, since exposures are assumed to occur at distances of 20 cm or more from persons. ANSI C95.1:2005 + Amd 1:2010 specifies a minimum separation distance of 20 cm for performing reliable field measurements to determine adherence to MPE limits. If the minimum separation distance between a transmitter and nearby persons is more than 20 cm under normal operating conditions, compliance with MPE limits may be determined at such distance from the transmitter. When applicable, operation instructions and prominent warning labels may be used to alert the exposed persons to maintain a specified distance from the transmitter or to limit their exposure durations and usage conditions to ensure compliance. If the use of warning labels on a transmitter is not effective or desirable, the alternative of performing SAR evaluation with the device at its closest range to persons under normal operating conditions may be used. The field strength and power density limits adopted by the FCC are based on whole-body averaged exposure and the assumption of RF field levels relate most accurately to estimating whole-body averaged SAR. This means some local values of exposures exceeding the stated field strength and power density limits may not necessarily imply non-compliance if the spatial average of spatially averaged RF fields over the exposed portions of a person's body does not exceed the limits.

COMPLIANCE WITH 2.1091

*"Mobile devices that operate in the Cellular Radiotelephone Service, the Personal Communications Services, the Satellite Communications Services, the General Wireless Communications Service, the Wireless Communications Service, the Maritime Services and the Specialized Mobile Radio Service authorized under subpart H of part 22 of this chapter, parts 24, 25, 26 and 27 of this chapter, part 80 of this chapter (ship earth stations devices only) and part 90 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more, or if they operate at frequencies above 1.5 GHz and their ERP is 3 watts or more. Unlicensed personal communications service devices, unlicensed millimeter wave devices and unlicensed NII devices authorized under §§15.253, 15.255, and 15.257, and subparts D and E of part 15 of this chapter are also subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if their ERP is 3 watts or more or if they meet the definition of a portable device as specified in §2.1093(b) requiring evaluation under the provisions of that section. **All other mobile and unlicensed transmitting devices are categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in §§1.1307(c) and 1.1307(d) of this chapter. Applications for equipment authorization of mobile and unlicensed transmitting devices subject to routine environmental evaluation must contain a statement confirming compliance with the limits specified in paragraph (d) of this section as part of their application.**"*

The EUT will only be used with a separation distance of 20 centimeters or greater between the antenna and the body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b). Per 47 CFR 1.1310, the EUT meets the General Population / Uncontrolled exposure limits listed in Table 1.

COMPLIANCE WITH FCC KDB 447498 D01 General RF Exposure Guidance v06

"KDB 447498 D01 General RF Exposure Guidance v06" provides the procedures, requirements, and authorization policies for mobile and portable devices. Section 7.2 best fits the exposure condition described in this report. Since these mobile devices are categorically excluded from routine evaluation; simple calculations may be used to estimate the power density to demonstrate compliance with 47 CFR 1.1310 requirements. The attached estimate shows MPE limits are met for standalone transmission at a 20 cm boundary.

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

FCC LIMITS FOR MPE

Limits for General Population /Uncontrolled Exposure: 47 CFR 1.1310

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	824/f	2.19/f	*(180/f ²)	30
30 - 300	27.5	0.073	0.2	30
300 - 1500			f/1500	30
1500 - 100000			1	30

f = frequency in MHz

* = Plane-wave equivalent power density

METHOD OF EVALUATION

The exposure level for the radio is evaluated at a 20 cm distance from the radio's transmitting antenna using the general equation:

$$S = \frac{P * G}{4 * \pi * R^2}$$

Where: S = power density (mW/cm²)

P = power input to the antenna (mW)

G = numeric power gain relative to an isotropic radiator

R = distance to the center of the radiation of the antenna (20 cm = limit for MPE estimates)

P*G = EIRP

Solving for S, the maximum power density 20 cm from the transmitting antenna is determined. This level is then compared to the applicable limit for that transmit frequency. The MPE ratios for each co-located radio are summed. If the sum is less than or equal to one, then the device is excluded from testing and is deemed compliant.

The standalone MPE and summed MPE ratios are summarized in the following table:

Radio	Transmit Frequency (MHz)	Conducted Output Power (mW)	Duty Cycle	Highest Antenna Gain (dBi)	Minimum Antenna Cable Loss (dB)	Separation Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Ratio
Hybrid	902.6	44.7	1	1.6	0	20	0.013	0.6	0.0214
Max Ratio									0.0214

Radio	Transmit Frequency (MHz)	Radiated Output Power (mW) EIRP	Duty Cycle	Separation Distance (cm)	Radiated Calculated Exposure Power	Limit (mW/cm ²)	Ratio
BTLE	2480	0.9	1	20	0.00018	1.0	0.0002
Max Ratio							0.0002

Sum of Maximum Ratios	Limit	Compliant
0.0216	1	Yes