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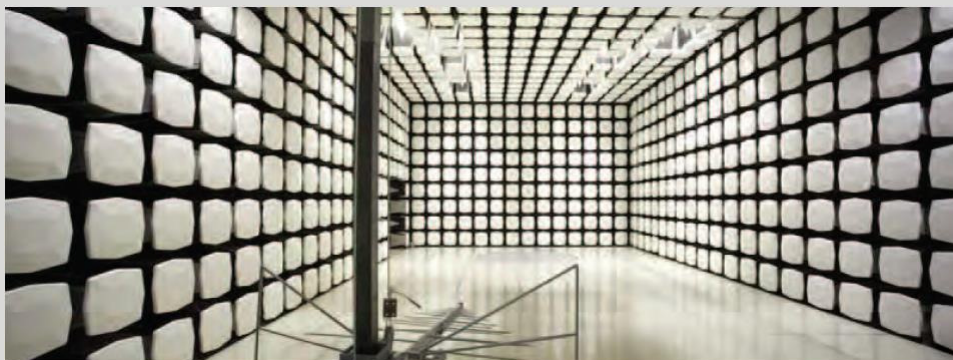
Awarepoint Corporation

BLETW

FCC 2.1093:2017

Bluetooth Low Energy Radio
802.11bg SISO Radio

Report # AWAR0021.9 Rev. 1



NVLAP Lab Code: 200630

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CERTIFICATE OF EVALUATION

Last Date of Evaluation: May 4, 2017
Awarepoint Corporation
Model: BLETW

Radio Equipment Evaluation

Standards

Specification	Method
FCC 2.1093:2017	FCC 447498 D01 General RF Exposure Guidance v06

Results

Method Clause	Evaluation Description	Applied	Results	Comments
4.3	SAR Test Exclusion	Yes	Pass	

Deviations From Evaluation Standards

None

Approved By:

Donald Facteau, System Architect

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the evaluation and equipment modes of operation represented in this report were agreed upon by the client, prior to evaluating. This Report may only be duplicated in its entirety. 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.

RF Exposure Condition



The following RF Exposure conditions were used for the assessment documented in this report:

Intended Use	Portable
Location on Body (if applicable)	Head/Torso
Co-located Radios	802.11bg BTLE
Simultaneous Transmitting Radios	802.11bg, BTLE
Body Worn Accessories	None
Environment	General Population/Uncontrolled Exposure

REVISION HISTORY



Revision Number	Description	Date	Page Number
00	None		
01	Updated Logo	5/8/2017	1-6
01	Updated compliance and EAR statements	5/8/2017	1,2
01	Update Facilities and Accreditations Pages	5/8/2017	4,5

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 Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

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

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:

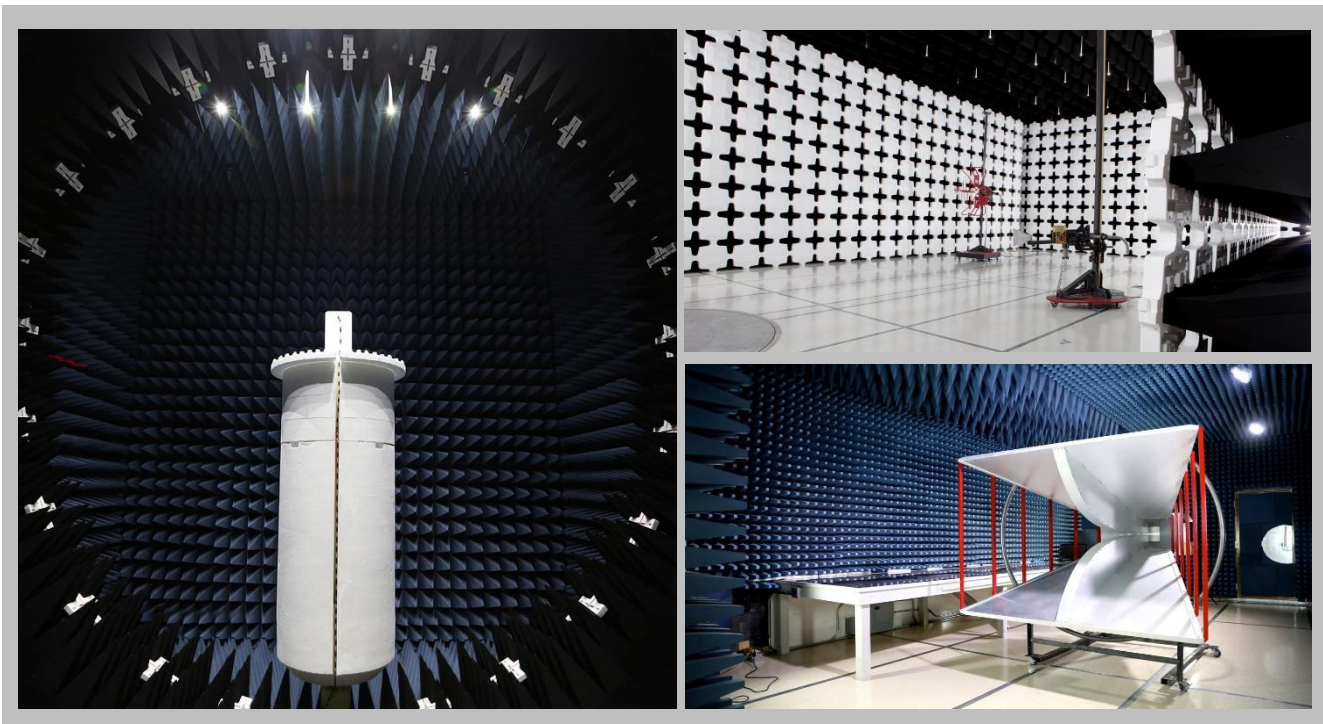
<http://portlandcustomer.element.com/ts/scope/scope.htm>

<http://gsi.nist.gov/global/docs/cabs/designations.html>

FACILITIES



California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
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
Innovation, Science and Economic Development 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/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157





PRODUCT DESCRIPTION

Client and Equipment Under Evaluation (EUT) Information

Company Name:	Awarepoint Corporation
Address:	600 W. Broadway Suite 250
City, State, Zip:	San Diego, CA 92101
Evaluation Requested By:	John Taylor
Model:	BLETW
First Date of Evaluation:	May 4, 2017

Information Provided by the Party Requesting the Evaluation

Functional Description of the EUT:

BLE Tag: Primarily a Bluetooth Low Energy scanner (Receiver) that measures RSSI of BLE beacons and then periodically connects with a WiFi access point to transmit collected BLE scans for the purpose of location tracking or for configuration and firmware updates.

Objective:

To demonstrate compliance of the co-located BLE and 802.11 radio with FCC requirements for RF exposure for 2.1093 portable devices.



SAR TEST EXCLUSION

OVERVIEW

Human exposure to RF emissions from portable devices (47 CFR §2.1093) used with the radiating antenna closer than 20 cm to the user requires Specific Absorption Rate (SAR) to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation.

COMPLIANCE WITH FCC 2.1093

“Portable devices that operate in the Cellular Radiotelephone Service pursuant to part 22 of this chapter; the Personal Communications Service (PCS) pursuant to part 24 of this chapter; the Satellite Communications Services pursuant to part 25 of this chapter; the Miscellaneous Wireless Communications Services pursuant to part 27 of this chapter; the Maritime Services (ship earth station devices only) pursuant to part 80 of this chapter; the Specialized Mobile Radio Service, the 4.9 GHz Band Service, and the 3650 MHz Wireless Broadband Service pursuant to part 90 of this chapter; the Wireless Medical Telemetry Service (WMTS) and the Medical Device Radiocommunication Service (MedRadio), pursuant to subparts H and I of part 95 of this chapter, respectively, unlicensed personal communication service, unlicensed NII devices and millimeter wave devices authorized under §§15.253(f), 15.255(g), 15.257(g), 15.319(i), and 15.407(f) of this chapter; and the Citizens Broadband Radio Service pursuant to part 96 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use. All other portable 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 portable transmitting devices subject to routine environmental evaluation must contain a statement confirming compliance with the limits specified in paragraph (d) of this section. Technical information showing the basis for this statement must be submitted to the Commission upon request.”

The EUT will be used with a separation distance of less than 20 centimeters between the radiating antenna and the body of the user or nearby persons and must therefore be considered a portable transmitter per 47 CFR 2.1093(b).

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.

Standalone radio SAR test exclusion is covered under section 4.3.1. Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Thresholds are met as shown in the Limits section below.

Simultaneous transmission SAR test exclusion is covered under section 4.3.2. SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

SAR TEST EXCLUSION

LIMITS

Limits for General Population /Uncontrolled Exposure: 47 CFR 1.1310 (c)

The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the SAR test exclusion thresholds are 1-g for head and body SAR and 10-g SAR for extremity SAR.

ASSESSMENT

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [f(\text{GHz})] = 3.0$ for 1-g SAR and $= 7.5$ for 10-g extremity SAR;

where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step b below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1f) is applied to determine SAR test exclusion.

The stand-alone SAR Test Exclusion Threshold is summarized in the following table for each radio:

Radio	Transmit Frequency (MHz)	Measured Conducted Output Power (mW)	Duty Cycle	Minimum Separation Distance (mm)	Exclusion Threshold	Limit	Compliant
802.11bg	2437	13.2	0.0285	5	0.118	3.0	Yes
BTLE	2402	0.4	1	5	0.124	3.0	Yes

Values for the measured radiated and conducted output powers, and the antenna gains were obtained from the test reports and frequency block diagrams

When an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine if the simultaneous transmission SAR test exclusion criteria is met:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})} / x]$ W/kg, for test separation distances ≤ 50 mm;

where

- $x = 7.5$ for 1-g SAR
- $x = 18.75$ for 10-g SAR

SAR TEST EXCLUSION



The estimated SAR is summarized in the following table for each radio:

Radio	Transmit Frequency (MHz)	Measured Conducted Output Power (mW)	Duty Cycle	Minimum Separation Distance (mm)	Estimated Standalone SAR (W/kg)	Limit (W/kg)	Compliant
802.11bg	2437	13..2	0.0285	5	0.0157	1.6	Yes
BTLE	2402	0.4	1	5	0.5228	1.6	Yes

The estimated SAR is used only to determine simultaneous transmission SAR test exclusion; it should not be reported as the standalone SAR. If the sum of the estimated SAR levels is less than the SAR limit, then SAR test exclusion can be applied:

Sum of Estimated SAR Levels (W/kg)	Limit (W/kg)	Compliant
0.5384	1.6	Yes

Therefore the simultaneous SAR test exclusion requirements are met.

May 4, 2017

Re: Awarepoint model BLET and BLETW transmitter max power attestation.
Applicant: Awarepoint Corporation

The BLET (Asset tag) is attached to equipment such that human exposure at levels of interest is not possible. The BLETW (Wearable tag) which is designed to be worn by either patients or staff has a minimum spacing from the center of the WiFi antenna to the surface of the housing of 3.75mm.

These tags use a 1 second sample (BLE RX) and reporting (WiFi TX) period during normal operation with a worst case sample rate. At the end of each 1 second period the WiFi transmits 3 groups of 3 packets of 1.70mS each for a total transmit time of 15.3mS every second for a worst case duty factor of 1.53%.

The WiFi radio can also transmit during configuration requests and firmware updates which use the radio in predominately receive mode and no more often than once per hour. The firmware update is the longest activity at 120 seconds worst case with a maximum transmission ratio of 70 TX bytes for every 1700 RX bytes and never more often than once in any 6 minute window (360 seconds) due to the 1 hour update limitation: $70B/1770B \times 120S/360S = 1.32\%$ duty factor. Adding the worst case sample transmission on top of the worst case firmware update during the same 6 minute window results in a worst case duty factor of 2.85%.

Best regards,



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