



MSA Innovation, LLC

G1 SCBA Power Module Type 5

HVINS: Beacon, Type 5 and Telemetry and Beacon, Type 5

FCC 2.1093:2026

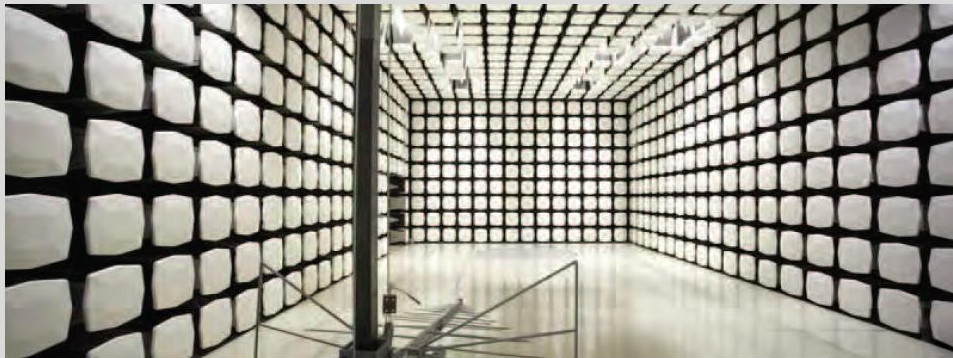
802.15.4

Bluetooth

LRR

RFID

Report: F3EN0262.5 Rev. 01, Issue Date: August 13, 2026



This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. Government. This Report shall not be reproduced, except in full without written approval of the laboratory.

This report is Block chain Verified. To verify the report's authenticity, please visit <https://www.blockchain-verified.com/> or by clicking the logo to the right.



TABLE OF CONTENTS



Section	Page Number
Certificate of Evaluation.....	3
Revision History.....	4
Facilities.....	5
Product Description	6
Exposure Condition.....	9
SAR Test Exclusion.....	10
Estimated SAR	14
End of Report.....	16

CERTIFICATE OF EVALUATION

Last Date of Evaluation: August 11, 2026

MSA Innovation, LLC

EUT: G1 SCBA Power Module Type 5

RF Exposure Evaluation

Standards

Specification	Method
FCC 2.1093:2026	FCC 447498 D01 General RF Exposure Guidance v06

Results

Method Clause	Description	Applied	Results	Comments
4.3.1	SAR Test Exclusion	Yes	Pass	None

Deviations From Evaluation Standards

None

Note

There are 2 HVINs covered in this report. Beacon, Type 5 and Telemetry and Beacon, Type 5. All calculations were done using the model that includes the LRR radio. Removing this radio would only result in lowering the exposure level.

Approved By:



Donald Facteau, Process Architect

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test method even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Revised RFID assessment	2026-08-11	11, 12, 14

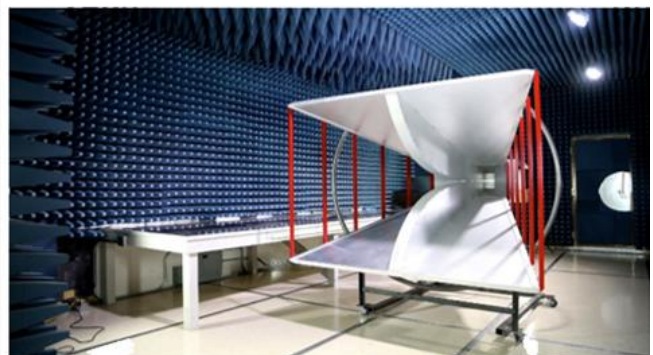
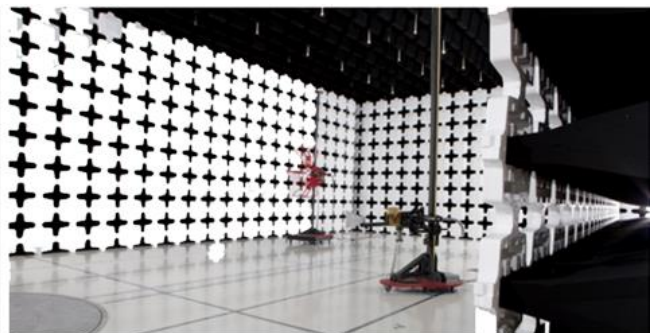
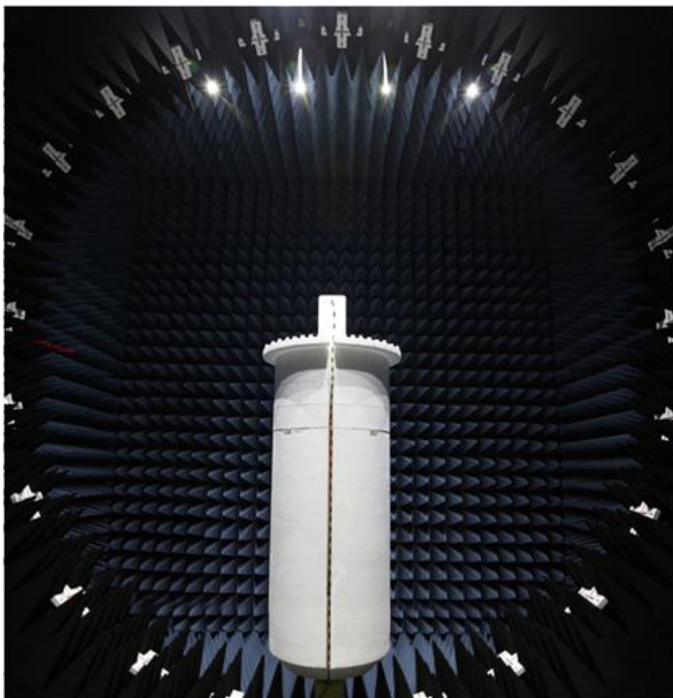
FACILITIES

Testing was performed at the following location(s)

	Location	Labs ⁽¹⁾	Address	A2LA ⁽²⁾	ISED ⁽³⁾	BSMI ⁽⁴⁾	VCCI ⁽⁵⁾	CAB	FDA ⁽⁶⁾
☐	California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
☐	Minnesota	MN01-11	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	3310.05	2834E	SL2-IN-E-1152R	A-0109	US0175	TL-57
☒	Oregon	EV01-12	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3310.02	2834D	SL2-IN-E-1017	A-0108	US0017	TL-56
☐	Washington	NC01-05	19201 120th Ave NE Bothell, WA 98011 (425) 984-6600	3310.06	2834F	SL2-IN-E-1153R	A-0110	US0157	TL-67
☐	Offsite	N/A	See Product Description	N/A	N/A	N/A	N/A	N/A	N/A

See data sheets for specific labs

- (1) The lab designations denote individual rooms within each location. (OC01, OC02, OC03, etc.)
- (2) A2LA Certificate No.
- (3) ISED Company No.
- (4) BSMI No.
- (5) VCCI Site Filing No.
- (6) FDA ASCA No.



PRODUCT DESCRIPTION

Client and Equipment Under Evaluation Information

Company Name:	MSA Innovation, LLC
Address:	1000 Cranberry Woods Drive
City, State, Zip:	Cranberry Township, PA 16066
Evaluation Requested By:	Clint Flemming
EUT:	G1 SCBA Power Module Type 5
Date of Evaluation:	8/11/2026

Information Provided by the Party Requesting the Evaluation

Functional Description of the Equipment:

Self-contained breathing apparatus for firefighters

The following tables show the low duty cycle analysis.

Radio	Frequency	Duty Cycle	Separation Distance
Bluetooth	2445 MHz	50%	63.9 mm
RFID	13.56 MHz	50%	64.8 mm
LRR	915 MHz	0.6%	59.8 mm
802.15.4 – Ant 1	2445 MHz	0.72%	71.5 mm
802.15.4 – Ant 2	2445 MHz	0.72%	68.6 mm

LRR Duty Cycle

Each LRR transmission has an on-air time of 16.25 ms and is repeated every 3.2 seconds (3200 ms).

$$Duty\ Cycle = \frac{16.25ms}{3200ms} * 100 = 0.507\%$$

0.6% is used to be conservative

802.15.4 Duty Cycle

Each antenna transmits 4 packets per second, and each packet has a measured on-air time of 1.8 ms. Since only one antenna transmits at a time, the duty cycle is calculated separately for each antenna.

$$Duty\ Cycle = 4 * 1.8ms * 100 = 0.72\%$$

RFID Duty Cycle

The EUT behaves like the following:

- 5 Seconds of RFID field activation
- 5 Seconds of button press to re-enable RFID

This behavior represents a 50% duty cycle

Bluetooth Duty Cycle

The device is physically restricted from transmitting more than 1 out of every 2 time slots. This means the device is strictly limited to $\leq 50\%$.

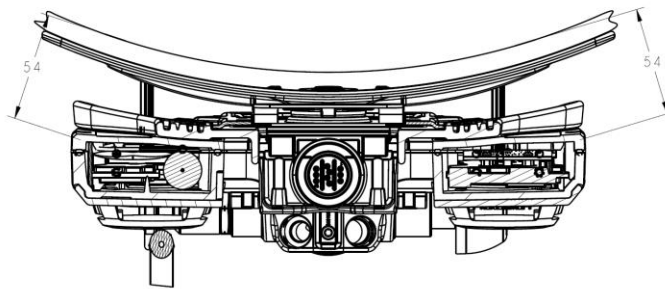
PRODUCT DESCRIPTION

Separation Distance

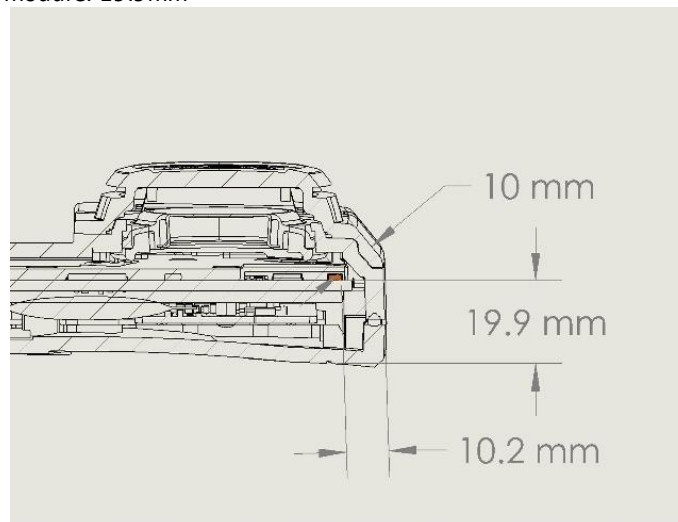
The separation distance is determined by the following:

Separation Distance = Radio to Power Module + Power Module to User

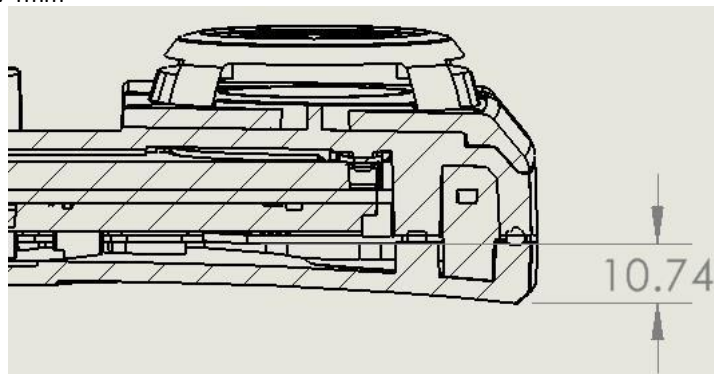
Power module from enclosure to user: 54mm



Bluetooth antenna to power module: 19.9mm

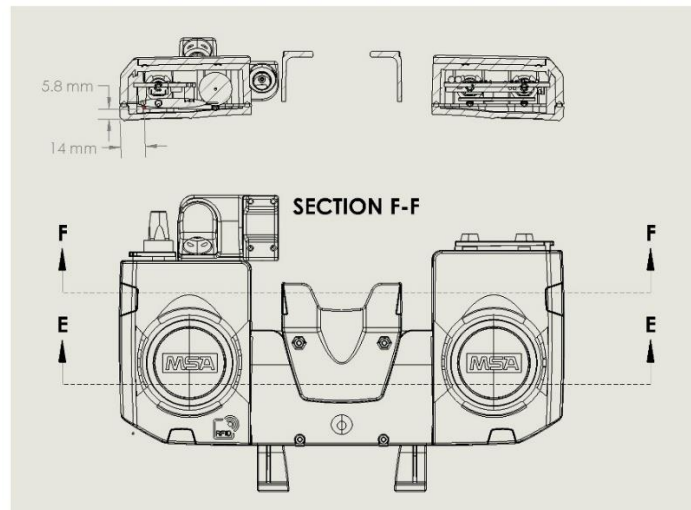


RFID to power module: 10.74mm

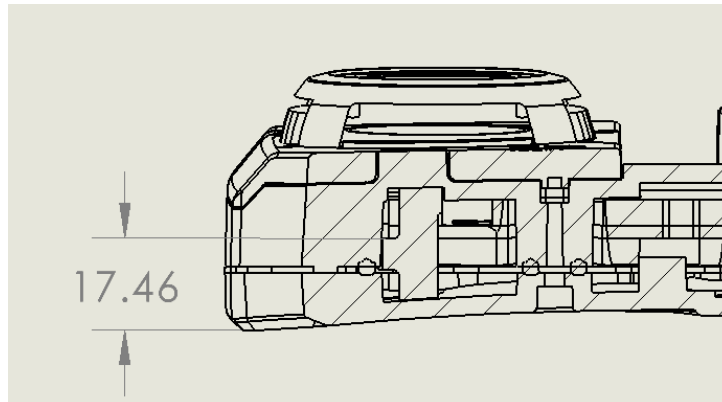


PRODUCT DESCRIPTION

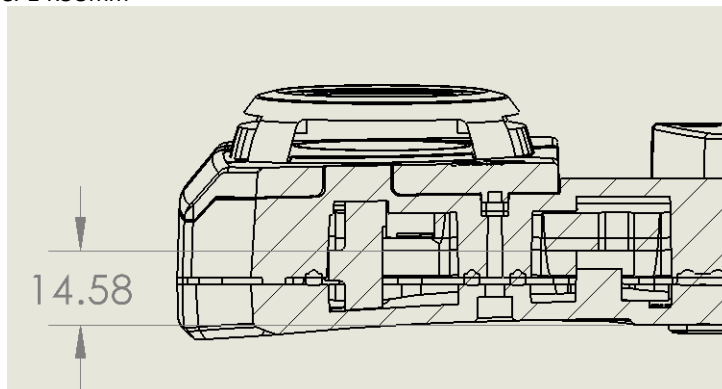
LRR antenna to power module: 5.8mm



Antenna 1 to power module: 17.46mm



Antenna 2 to power module: 14.58mm



Objective:

To demonstrate compliance with FCC RF exposure requirements for 2.1093 portable devices.

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
How is the Device Used	The device is hung on the body of the user
Radios Contained in the Same Host Device	802.15.4 Bluetooth LRR RFID
Simultaneous Transmitting Radios	802.15.4, Bluetooth, LRR, RFID and 802.15.4, Bluetooth, RFID
Body Worn Accessories	N/A
Environment	General Population/Uncontrolled Exposure

Note:

This report covers both HVIN: Beacon, Type 5 and Telemetry and Beacon, Type 5. The Beacon, Type 5 and Telemetry configuration was determined to be the worst-case configuration because it included the optional LRR module.

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 REQUIREMENTS IN 47 CFR §2.1093

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).

47 CFR §2.1093

“(b) For purposes of this section, the definitions in §1.1307(b)(2) of this chapter shall apply. A portable device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that the RF source’s radiating structure(s) is/are within 20 centimeters of the body of the user.”

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 kHz 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 (KDB 447498 D01 GENERAL RF EXPOSURE GUIDANCE V06)

- a) 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:

$$\left[\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} \right] \cdot [\sqrt{f(\text{GHz})}] = \begin{matrix} 3.0 \text{ for 1-g SAR} \\ 7.5 \text{ for 10-g extremity SAR} \end{matrix}$$

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

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.

- b) 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 (also illustrated in Appendix B):

- 1) $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz})/150)]\}$ mW, for 100 MHz to 1500 MHz
- 2) $\{[\text{Power allowed at numeric threshold for 50 mm in step a)}] + [(\text{test separation distance} - 50 \text{ mm}) \cdot 10]\}$ mW, for > 1500 MHz and ≤ 6 GHz

- c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion

- 1) For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$
- 2) For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$
- 3) SAR measurement procedures are not established below 100 MHz.

SAR TEST EXCLUSION

APPARENT POWER

When the transmitted signal is measured as a field strength value (dBμV/m), this value is converted to a power level using the following derivation:

Step 1 – Per the Friis equation, the relationship between EIRP and field strength is as follows:

$$EIRP_{meas} = E_{meas} - 95.3$$

Where:

EIRP_{meas} is the equivalent isotropically radiated power in dBm as converted from a measured value

E_{meas} is the field strength at a 3 m measurement distance in dBμV/m. Measurements at distances other than 3m were distance corrected to 3 m by 40 dB/decade.

Step 2 – If a power tolerance or a tune-up value is provided, the reported power should be scaled accordingly:

$$EIRP = EIRP_{meas} + Tolerance$$

Where:

EIRP is the maximum equivalent isotropically radiated power in dBm

EIRP_{meas} is the equivalent isotropically radiated power in dBm as converted from a measured value

Tolerance is either the tolerance provided in dB or the positive tune-up tolerance range in dB

Step 3 – Convert the EIRP value to linear terms

$$EIRP(mW) = 10^{\frac{EIRP(dBm)}{10}}$$

Where:

EIRP is the maximum equivalent isotropically radiated power, in terms of either mW or dBm

When the transmitted field strength value is reported as a magnetic field strength value, (dBμA/m), the value is converted to an electric field strength, (dBμV/m), by adding the free-space impedance, 20log(377 ohm) ~ 51.5 dBohm to the magnetic field strength (in logarithmic terms).

SAR TEST EXCLUSION

ASSESSMENT

By operating below the SAR Test Exclusion Threshold, the standalone radio is compliant with the requirements of 47 CFR §1.1310. If applicable, collocated radios are further assessed later in this document. The SAR Test Exclusion Threshold is summarized in the following table(s):

Radio	Frequency Range (MHz)	Field Strength @ 30m (dBuV/m) or Conducted Power (dBm)	Duty Cycle	Minimum Separation Distance (mm)	Exclusion Threshold	Limit	Compliant
RFID	13.56-13.56	24.1 dBuV/m	50.0%	64.8	0.0	2447.4	yes
RFID	13.56-13.56	23.0 dBm	50.0%	64.8	99.8	2447.4	yes

The information in the table above was obtained from:

A measured value was used for the field strength in these calculations. Customer supplied max conducted power to the radiating element. Reference Element Report #: F3EN0262.2

Radio	Frequency Range (MHz)	Max Rated Power	Duty Cycle	Antenna Assembly Gain (dBi)	Minimum Separation Distance (mm)	Exclusion Threshold	Limit	Compliant
LRR	902-928	26.96 dBm	0.6%	3.1	59.8	3.0	216.3	yes

The information in the table above was obtained from:

The maximum rated power was used. Customer supplied information

Radio	Frequency Range (MHz)	Max Rated Power	Duty Cycle	Antenna Assembly Gain (dBi)	Minimum Separation Distance (mm)	Exclusion Threshold	Limit	Compliant
Bluetooth	2402-2480	8.0 dBm	50.0%	1.8	63.9	3.2	234.3	yes

The information in the table above was obtained from:

The maximum rated power was used. Customer supplied information

Radio	Frequency Range (MHz)	Max Rated Power	Duty Cycle	Antenna Assembly Gain (dBi)	Minimum Separation Distance (mm)	Exclusion Threshold	Limit	Compliant
802.15.4: Antenna 2	2405-2475	20.0 dBm	0.7%	4.0	68.6	0.7	281.3	yes
802.15.4: Antenna 1	2405-2475	20.0 dBm	0.7%	3.22	71.5	0.7	310.3	yes

The information in the table above was obtained from:

The maximum rated power was used. Customer provided information. Referenced Element Report #: F3EN0262.1 Rev. 01

Evaluator: Frank Wong

ESTIMATED SAR

METHOD OF EVALUATION – SIMULTANEOUS TRANSMISSION CONFIGURATION

KDB 447498 D01 General RF Exposure Guidance v06, Section 4.3.2(b)

“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 the simultaneous transmission SAR test exclusion criteria:

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

where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

- 2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is $> 50 \text{ mm}$.

This SAR estimation formula has been considered in conjunction with the SAR Test Exclusion Thresholds to result in substantially conservative SAR values of $= 0.4 \text{ W/kg}$. When SAR is estimated, the peak SAR location is assumed to be at the feed-point or geometric center of the antenna, whichever provides a smaller antenna separation distance, and this location must be clearly identified in test reports. The estimated SAR is used only to determine simultaneous transmission SAR test exclusion; it should not be reported as the standalone SAR. When SAR is estimated, it must be applied to determine the sum of 1-g SAR test exclusion. When SAR to peak location separation ratio test exclusion is applied, the highest reported SAR for simultaneous transmission can be an estimated standalone SAR if the estimated SAR is the highest among the simultaneously transmitting antennas (see also KDB Publication 690783 D01). For situations where the estimated SAR is overly conservative for certain conditions, the test lab may choose to perform standalone SAR measurements, then use the measured SAR to determine simultaneous transmission SAR test exclusion. Estimated SAR values at selected frequencies, distances, and power levels are illustrated in Appendix D.

In the table below, the estimated stand-alone SAR for the radio(s) capable of simultaneous transmission is listed. The estimated values have been summed and compared to the SAR limit. The result of the calculation is well below the limit therefore the unit is excluded from simultaneous SAR evaluation and deemed compliant with FCC RF exposure requirements.

ESTIMATED SAR

Radio	Band	Transmit Frequency (GHz)	Test Separation (mm)	Time Averaged Output Power (mW)	Duty Cycle	Estimated SAR (W/kg)	Specification (W/kg)
802.15.4	Antenna 1	2.475	71.5	0.7	0.0072	0.4	1.6
Bluetooth		2.48	63.9	3.2	0.5	0.4	1.6
LRR		0.928	59.8	3	0.006	0.4	1.6
RFID		0.01356	64.8	100	0.5	0.4	1.6
Estimated Summed SAR						1.6	1.6

The information in the table above was obtained from:
See standalone document above

Radio	Band	Transmit Frequency (GHz)	Test Separation (mm)	Time Averaged Output Power (mW)	Duty Cycle	Estimated SAR (W/kg)	Specification (W/kg)
802.15.4	Antenna 2	2.475	68.6	0.7	0.0072	0.4	1.6
Bluetooth		2.48	63.9	3.2	0.5	0.4	1.6
LRR		0.928	59.8	3	0.006	0.4	1.6
RFID		0.01356	64.8	100	0.5	0.4	1.6
Estimated Summed SAR						1.6	1.6

The information in the table above was obtained from:
See standalone document above

End of Test Report