

Test Report No. <i>Prüfbericht-Nr.:</i>	US252450.001 Rev. 01	Order No. <i>Auftrags-Nr.:</i>	P01272009 0234217169	Page 1 of 20 Seite 1 von 20
Client Reference No.: <i>Kunden-Referenz-Nr.:</i>	2538929	Order date: <i>Auftragsdatum:</i>	11/27/2023	
Client: <i>Auftraggeber:</i>	BigBelly, LLC 150 A Street - Suite 103 Needham MA 02494 USA			
Identification/ Type No.: <i>Bezeichnung / Typ-Nr</i>	Chute Smart Max ACS w/ Companion (Companion w/ACS, WIL) w/optional Charger			
Order content: <i>Auftrags-Inhalt:</i>	RF Exposure Evaluation			
Test specification: <i>Prüfgrundlage</i>	47 CFR 1.1307 and 1.1310 FCC KDB 447498 D04 v01			
Date of sample receipt: <i>Wareneingangsdatum:</i>	11/28/2023			
Test sample No: <i>Prüfmuster-Nr.:</i>	601100001			
Testing period: <i>Prüfzeitraum</i>	4/30/2025 - 4/30/2025			
Place of testing: <i>Ort der Prüfung:</i>	TUV Rheinland of North America Inc. 5015 Brandin Ct Fremont CA 94538 USA			
Testing laboratory: <i>Prüflaboratorium</i>	TUV Rheinland of North America, Inc.			
Test result*: <i>Prüfergebnis*:</i>	Pass			
Tested by: <i>geprüft von:</i>	Isaac Aguilar	Authorized by: <i>genehmigt von:</i>	Dieter Paasche	
Date: 4/30/2025 <i>Datum:</i>		Issue Date: 4/30/2025 <i>Ausstellungsdatum:</i>		
Position / Stellung:	Test Engineer	Position / Stellung:	Expert	
Others / <i>Sonstiges:</i>				
Condition of the test item at delivery: <i>Zustand des Prüfgegenstandes bei Anlieferung:</i>				
* Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested * Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet				
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TÜV Rheinland of North America, Inc., 5015 Brandin Ct., Fremont, CA 94538, USA

Mail: info@us.tuv.com · Web: www.tuv.com/us

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Remarks
Anmerkungen

1	The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request. <i>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</i> <i>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</i>
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3	Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report. <i>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</i> <i>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</i>
4	Electromagnetic Compatibility Test Report. The above product was found to be Compliant to the above test standard(s).

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Product description
Produktbeschreibung

1	Product details: <i>Produktdetails:</i>	Chute Smart Max ACS w/Companion (Companion w/ACS, WIL) w/ Optional Charger
2	Dimensions / Weight: <i>Maße / Gewicht:</i>	76.7 x 128.5 x 126.5 cm3/118.2 kg (Hub) & 77.3 kg (Companion)
3	Operating elements: <i>Bedienelemente:</i>	120 VAC, 230 VAC for optional AC Adaptor/50 – 60 Hz
4	Equipment / Accessories: <i>Ausstattung / Zubehör:</i>	--
5	Used materials: <i>Verwendete Materialien:</i>	--
6	Other: <i>Sonstiges:</i>	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
7	Test sample obtaining: <i>Prüfmusterbereitstellung:</i>	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ others:

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Revisions

Revision No.	Date	Reason for Change	Author
01	4/30/2025	Original Report	Isaac Aguilar

Note: Latest revision report will replace all previous reports.

1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of 47 CFR 1.1307 and 1.1310 based on the results of evaluation performed on 4/30/2025 to 4/30/2025 on BigBelly Smart Max w/Companion manufactured by BigBelly, LLC.

This report only applies to the specific sample evaluated under the stated conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

This report will evaluate compliance of RF exposure to the human body of BigBelly Smart Max w/Companion according to 47 CFR 1.1307 and 1.1310. Transmitters and/or configurations that are not exempt from routine evaluation are assessed according to acceptable FCC measurement procedures as defined in KDB 447498 D04v01.

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1.3 Summary of Test Results

Table 1: Summary of Test Results

Regulation	Test/Evaluation Method	Result
47 CFR 1.1307(b)(3)(i)	FCC KDB 447498 D04 v01	Complies
47 CFR 1.1310(e)(1)	FCC KDB 447498 D04 v01	Complies
47 CFR 1.1307(b)(3)(ii)	FCC KDB 447498 D04 v01	Complies
Note: None		

1.4 Special Accessories

None

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 US Federal Communications Commission, US1131



TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont Ca., 94538, are recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Pleasanton Registration No. US1131, Fremont Registration No. US1131). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

2.2 NIST / A2LA, Testing Cert #3331.02



TUV Rheinland of North America EMC test facilities are accredited by the American Association for Laboratory Accreditation (A2LA). The laboratories have been assessed and accredited by A2LA in accordance with ISO Standard 17025:2017 (Testing Certificate #3331.02). The Scope of Laboratory Accreditation includes emission and immunity testing.

The accreditations are updated annually.

2.3 Canada – Innovation, Science and Economic Development (ISED), 2932D



The Fremont 10-meter Semi-Anechoic Chamber, Registration No. 2932D, has been accepted by ISED to perform testing to 3 and 10 meters based on the test procedures described in ANSI C63.4-2014.

2.4 Japan – VCCI



The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information

Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct. Fremont Ca., 94538, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Fremont: A-409

2.5 Acceptance by Mutual Recognition Arrangement



The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TÜV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

2.6 BSMI

Registration No.: SL2-IN-E-1150R. The BSMI accreditation was obtained by NIST MRA with the BSMI

2.7 Korea

(Designation No.: US0185). Recognized by National Radio Research Agency (RRA) as an accredited Conformity Assessment Body (CAB) under the terms for Korea Phase I of the APEC TEL.

2.8 Test Facilities

Test facilities are located at 5015 Brandin Ct, Fremont, California, 94538, USA and 1279 Quarry Lane, Pleasanton, California 94566, USA (Fremont is the Pleasanton Annex).

country.

2.9 Test Facilities

Test facilities are located at 5015 Brandin Ct, Fremont, California, 94538, USA and 1279 Quarry Lane, Pleasanton, California 94566, USA (Fremont is the Pleasanton Annex).

2.9.1 Emission Test Facility

The Semi-Anechoic Chambers and AC Line Conducted measurement facilities used to collect radiated and conducted emissions data have been constructed in accordance with ANSI C63.7:1992. The Fremont 10 meter semi-anechoic chamber has been measured in accordance with and verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2014 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04), at test distances of 3 and 10 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02). The Pleasanton 5 meter semi-anechoic chamber has been verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2014 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04) at a test distance of 3 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02).

2.10 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

The Expanded Uncertainty defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurement and the fraction may be viewed as the coverage probability or level of confidence of the interval.

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2.1 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2017. Equipment calibration records are kept on file at the test facility.

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3 Equipment Under Test

3.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and manufacturer details. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

3.2 Customer

Table 2: Customer Information

Client	BigBelly, LLC
Address 1	150 A Street - Suite 103 Needham MA 02494 USA
Contact Person	Sean Garrett
Telephone	+1 (888) 820 – 0300 (x368)
Fax	--

Table 3: Technical Contact Information

Contact Person	Sean Garrett
Telephone	+1 (888) 820 – 0300 (x368)
E-Mail	sgarrett@bigbelly.com

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3.3 Equipment Under Test Specifications

Table 4: EUT Specifications

EUT Specifications	
Exposure Type	☒ General Population / Uncontrolled ☐ Occupational / Controlled
Dimensions	76.7 x 128.5 x 126.5 cm3
Power Input	230V/50Hz; 0.48A
Operating Temperature Range:	-20 to +55 oC
Multiple Feeds:	☐ Yes: ☒ No
Hardware Version/Model	BigBelly Smart Max w/Companion
Firmware Version	06.30
RF Software Version	37.00.417
Product Marketing Name	Chute Smart Max ACS w/ Companion (Companion w/ ACS, WIL) w/Optional Charger
Operating Mode	Bluetooth Low Energy LTE CAT-M1 LTE NB-IoT GSM
Transmitter Frequency Band	<u>RFID:</u> 13.561 MHz <u>BLE:</u> 2400 – 2480 MHz <u>LTE:</u> B2: 1850 – 1910 MHz B4: 1710 – 1755 MHz B5: 824 – 849 MHz B12: 699 – 716 MHz B13: 777 – 787 MHz B25: 1850 – 1915 MHz B26: 814 – 849 MHz B66: 1710 – 1780 MHz B71: 663 – 698 MHz B85: 728 – 746 MHz <u>GSM:</u> 850: 869 – 894 MHz 1900: 1930 – 1990 MHz
Antenna Manufacturer	<u>BLE:</u> Expressif <u>LTE:</u> Taoglas

EUT Specifications	
Antenna Model	BLE: N/A (PCB Trace antenna) LTE: PA.26A
Antenna Type	BLE: PCB Antenna LTE: PA.26A
Antenna Gain	BLE: 3.4 dBi LTE/GSM: 698 - 806 MHz: +0.4 dBi 824 – 960 MHz: + 1.9 dBi 1710 – 2200 MHz: +3.7 dBi
Modulation Type	BLE: GFSK LTE: BPSK, QPSK, 16-QAM
TX/RX Chain (s)	1 Spatial Stream
Type of Equipment	Outdoor
Note: 1. All EUT specifications are provided by the manufacturer or the TUV direct customer. Information supplied by the customer and can affect the validity of results.	

Table 5: EUT Test Samples

Equipment	Manufacturer	Model	Serial	Used for
Smart Hub	BigBelly Solar, LLC	BigBelly Smart	601100001	RSE

Note: None.

Table 6: Power Setting/Specifcation

Freq. (MHz)	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Note:

- Power values obtain from the module manufacturer's reports:
 BLE: TA-MB-04-005 (FCC ID: 2AC7Z-ESP32WROOM32U)
 LTE/GSM: STS1912245W01, STS1912245W02, STS1912245W03 (FCC ID: R17ME910G1WW)

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Table 7: General Product Information

Dimensions	Height:	126.5 cm	Width:	128.5 cm	Length:	76.7 cm
Weight	195.5 kg		Fork-lift Needed:		Yes	
Note:						
1. Reported values are EUT + Companion.						

Table 8: Electrical Power Type

Name	Type	Voltage		Frequency (Hz)	Current (A)
		Min	Max		
AC Mains	AC Adapter	100	240	50 – 60	0.48
Note:					
1. Voltage provided by optional AC adapter Charger Model: SMI 18-15, PN: SMI 18-15-V-P5					

Table 9: EUT Interface/Port Specifications

EUT Port	Connect To	Location	Length	Shielded/ Unshielded
--	--	--	--	--

4 Product Information

4.1 Product Description

Built on Bigbelly's fundamentally better bin, the Smart Max hides waste in plain sight with its enclosed Hopper disposal interface. The Smart Max is equipped with a compactor and sensors that monitor and report fullness level, collection activity, bin status, and GPS location; all information is communicated to Bigbelly's CLEAN™ Management Console. With a capacity of 150 gallons (570 L), the Smart Max holds 5x more waste than a traditional bin. The Smart Max can be deployed standalone, or combined with any other Bigbelly bin to form a multi-stream kiosk.

4.2 Equipment Configuration

A description of the equipment configuration is given in the Equipment Under Test Section. The EUT was tested/evaluated as called for in the test standard and was configured and operated in a manner consistent with its intended use. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst-case radiation for emissions testing.

4.3 Operating Mode

In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum evaluated values.

5 RF Exposure Evaluation

The evaluation was performed accordance with 47 CFR 1.1307 and 1.1310 and FCC KDB 447498 D04 v01. The evaluation was performed to assess if the EUT meets the exemption criteria allowed per 47 CFR 1.1307 and 1.1310.

5.1 RF Exposure Exemption Assessment

RF exposure evaluation is exempt when the device operates under the prescribed values listed in §1.1307(b)(3)(i).

In this assessment, the method used to evaluate the EUT for RF Exposure Exemption is from §1.1307(b)(3)(i)(B). A single RF source is exempt if the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th}(mW) = \begin{cases} ERP_{20cm} \left(\frac{d}{20cm} \right)^x, & d \leq 20 \text{ cm} \\ ERP_{20cm}, & 20cm < d \leq 40 \text{ cm} \end{cases}$$

Where:

$$x = -\log_{10} \left(\frac{60}{ERP_{20cm}\sqrt{f}} \right) \text{ and } f \text{ is in GHz}$$

And:

$$ERP_{20cm}(mW) = \begin{cases} 2040f, & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060, & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm)

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5.2 Maximum Permissible Exposure (MPE) – Power Density Calculation

47 CFR 1.1310(e) sets the limits for Maximum Permissible Exposure (MPE) allowed to be incident on persons in an Occupational/Controlled and General Population/Uncontrolled Exposure condition. When a product is found to exceed the exemption limits of the section 5.1 then a power density of the RF energy radiated from the EUT may be calculated and evaluated to the MPE limits.

Table 10: Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
(I) Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	*(100)	≤ 6
3.0 – 30	1842/f	4.89/f	*(900/f ²)	≤ 6
30 – 300	61.4	0.163	1.0	≤ 6
300 – 1,500	--	--	f/300	≤ 6
1,500 – 100,000	--	--	5	≤ 6
(II) Limits for General Population/Uncontrolled				
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	0.73	0.2	< 30
300 – 1500	--	--	f/1500	< 30
1,500 – 100,000	--	--	1.0	< 30
Note: * = Plane-wave equivalent power density f = Frequency in MHz				

Power density emitted from the EUT is calculated using the following:

$$Power\ Density = \frac{PG}{4\pi r^2}$$

Where:

P ≡ Maximum Conducted Power (Linear)

G ≡ Antenna Gain (Linear)

r ≡ radial distance from the radiating element of the EUT to the user or the nearest edge.

5.3 Multiple RF Sources Exemption

A device which supports multiple radio sources which can transmit at the same time are subject exemption evaluation of 47 CFR 1.1307(b)(3)(ii). The sum of the fractional contributions is considered exempted from further evaluation if the sum is less than or equal to 1 as determined by the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for P_{th} , including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERP_j = the ERP of fixed, mobile, or portable RF source j.

$ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

$Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$Exposure Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.

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5.4 Evaluation calculations

The EUT is professionally installed, and the radial distances from the radiating elements to the edge of device have been used for this evaluation.

Table 11: RF Exposure Exemption Evaluation

Technology	Band	Frequency (GHz)	Gain (dBi)	Power (dBm)	ERP, P _i (mW)	Separation Distance (cm)	P _{th} , Limit (mW)	Margin (mW)
BLE	2400 - 2483.5 MHz	2.48	3.4	1.08	1.71	8.89	653.11	651.40
RFID	13.110 - 14.010 MHz	0.013561	0	< 0	< 0	7.62	N/A ²	N/A ²
LTE CAT-M	2	1.8575	3.7	23.69	334.32	22.86	3060.00	2725.68
LTE CAT-M	4	1.7115	3.7	23.86	347.66	22.86	3060.00	2712.34
LTE CAT-M	5	0.8465	1.9	23.51	211.91	22.86	1726.86	1514.95
LTE CAT-M	12	0.704	0.4	23.46	148.31	22.86	1436.16	1287.85
LTE CAT-M	13	0.7845	0.4	23.04	134.63	22.86	1600.38	1465.75
LTE CAT-M	25	1.86	3.7	23.75	338.97	22.86	3060.00	2721.03
LTE CAT-M	26(L)	1.9307	3.7	23.38	311.28	22.86	3060.00	2748.72
LTE CAT-M	26(U)	0.8315	1.9	23.87	230.23	22.86	1696.26	1466.03
LTE CAT-M	66	1.7793	3.7	23.61	328.21	22.86	3060.00	2731.79
LTE CAT-M	85	0.703	0.4	23.24	140.98	22.86	1434.12	1293.14
LTE NB-IoT	2	1.9099	3.7	23.86	347.66	22.86	3060.00	2712.34
LTE NB-IoT	4	1.7101	3.7	23.62	328.97	22.86	3060.00	2731.03
LTE NB-IoT	5	0.8365	1.9	23.24	199.14	22.86	1706.46	1507.32
LTE NB-IoT	12	0.7075	0.4	23.56	151.76	22.86	1443.30	1291.54
LTE NB-IoT	13	0.782	0.4	23.68	156.01	22.86	1595.28	1439.27
LTE NB-IoT	25	1.9149	3.7	23.70	335.09	22.86	3060.00	2724.91
LTE NB-IoT	26(L)	0.819	1.9	23.21	197.77	22.86	1670.76	1472.99
LTE NB-IoT	26(U)	0.824	1.9	23.86	229.70	22.86	1680.96	1451.26
LTE NB-IoT	66	1.7799	3.7	23.81	343.68	22.86	3060.00	2716.32
LTE NB-IoT	71	0.6805	0.4	21.89	103.31	22.86	1388.22	1284.91
LTE NB-IoT	85	0.707	0.4	23.63	154.23	22.86	1442.28	1288.05
GSM 850	EDGE	0.8488	1.9	27.84	574.32	22.86	1731.55	1157.23
GSM 1900	GPRS	1.88	3.7	30.41	1570.93	22.86	3060.00	1489.07
GSM 1900	EDGE	1.9098	3.7	26.72	671.67	22.86	3060.00	2388.33

Note:

- Power listed is Maximum conducted output power.
- Output power below 1 mW meeting the general exemption of 47 CFR 1.1307(b)(3)(i)(A).
- Gain is converted to dB_d before ERP is calculated by the following: dB_d = dBi – 2.15

Table 12: Maximum Permissible Exposure Evaluation

Technology	Band	Frequency (GHz)	Antenna Gain (dBi)	Power (dBm)	(EIRP) (mW)	Separation Distance (cm)	Power Density (W/cm ²)	Limit (W/cm ²)	Margin
GSM 850	GPRS	0.8488	1.9	33.23	3258.37	22.86	0.49618	1	0.504

Note:

- Power listed is Maximum conducted output power.

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Table 13: Multiple RF Sources Exemption Evaluation

Technology	Band	Frequency (GHz)	ERP, P _i (mW)	P _{th,i} (mW)	ERP _j (mW)	ERP _{th,j} (mW)	Power Density (W/cm ²)	Power Density Limit (W/cm ²)	SUM
GSM 850/Bluetooth									
GSM 850	GPRS	0.8488	--	--	--	--	0.496	1	0.499
BLE	2.4 GHz	2.48	1.71	653.11	--	--	--	--	
LTE NB-IoT/Bluetooth									
LTE	Band 71	0.6805	103.31	1388.22	--	--	--	--	0.077
BLE	2.4 GHz	2.48	1.71	653.11	--	--	--	--	
LTE CAT-M/Bluetooth									
LTE	Band 5	0.8465	334.32	3060	--	--	--	--	0.112
BLE	2.4 GHz	2.48	1.71	653.11	--	--	--	--	
Note:									
1. Evaluation values taken from Tables 11 and 12.									

5.5 Conclusion

The evaluation determined the EUT to be exempt from routine RF Exposure compliance evaluation for single RF sources per 47 CFR 1.1307(b)(3)(i) for all the supported technologies as listed in Table 11. GSM 850 due to its high power was evaluated to the requirements of 47 CFR 1.1310(e) and was found to be complaint with the applicable limit. The EUT supported multiple radio technologies which could be used simultaneously, and it was evaluated to 47 CFR 1.1307(b)(3)(ii) and was found to meet the exemption limits for multiple transmitting RF sources.

The EUT was found to be complaint with all applicable exemptions and RF exposure requirements.