Radio Frequency Exposure Evaluation Report

For:
Xirgo Technologies, LLC

Model Number:
XT1520

Product Description:
Proximity Bluetooth beacons with a single chip Bluetooth 5 + ARM mounted to distribution carts, which are used in conjunction with XT49xx devices installed on trailers.

FCC ID: GKM-XT1520
IC ID: 10281A-XT1520

Per:

CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISEDC RSS-102 Issue 5

Report number: EMC_XIRGO-132-20001_FCC_ISED_MPE_REV1

DATE: 2020-07-07

***CETECOM* Inc.**
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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
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Report reviewed by:

Date	Section	Name	Signature
2020-07-07	Compliance	Cindy Li (EMC Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I am approving this document Location: Date: 2020-07-07 18:46:10

Responsible for the Report:

Date	Section	Name	Signature
2020-07-07	Compliance	Chin Ming Lui (Associate EMC Engineer)	Chin Ming Lui Digitally signed by: Chin Ming Lui DN: CN = Chin Ming Lui email = chinming.lui@cetecom.com C = US O = CETECOM Date: 2020.07.07 17:26:06 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Lab Manager:	Cindy Li
Responsible Project Leader:	Akanksha Baskaran

2.2 Identification of the Client / Manufacturer

Client's Name:	Xirgo Technologies, LLC
Street Address:	188 Camino Ruiz
City/Zip Code	Camarillo, CA 93012
Country	USA

Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

Marketing name:	Vuvuzela Proximity Beacon
HW Version :	Rev D
SW Version :	NV11.1125AA1.1
Firmware Version Identification Number (FVIN):	N/A
Hardware Version Identification Number (HVIN):	XT1520
Product Marketing Name (PMN):	Vuvuzela Proximity Beacon
Regulatory Band:	❖ **BTLE:** ▪ Nominal band: 2400 MHz – 2483.5 MHz; ▪ Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 channels
Integrated Module Info:	❖ **BTLE:** ▪ Manufacturer: Nordic Semiconductor ▪ Module name: Bluetooth 5.2 SoC supporting Bluetooth Low Energy ▪ Model number: nRF52810 ▪ Modes of Operation: LE 1 Mbps & LE 2 Mbps in advertising mode
Antenna Information:	❖ **BTLE:** ▪ Type: PCB ▪ Location: Internal ▪ Antenna gain: 3.3 dBi ▪ Frequency Band: 2.4 GHz ISM
Maximum Conducted Output Power:	❖ **BTLE:** ▪ Peak Conducted Power: 4.50 dBm
Power Supply/ Rated Operating Voltage Range:	Low 2.2 VDC, Nominal 2.7 VDC, High 3.3 VDC
Operating Temperature Range:	Low -20º C, Nominal 25º C, High 54º C
Sample Revision:	☐Prototype Unit; ■Production Unit; ☐Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100000	1.0	30

IC

300 – 6000	0.02619 x f (MHz) $^{0.6834}$	6

4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC
operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9 dBm);
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9 dBm);

IC
300MHz < = operating frequency < 6 GHz: excluded if EIRP < 0.0131 x f (MHz) $^{0.6834}$ W

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm² or W/m²)
P = power input to the antenna (mW or W)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (cm or m)

5 Evaluations

5.1 Analysis of RF Exposure for simultaneous transmission

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on ERP/EIRP measured or calculated from known gain and conducted output power.

Radio	freq [MHz]	Max Conducted power [W]	Gain [dBi]	Gain [lin]	EIRP [W]	IC Limit [W/m2]	FCC LImit [W/m2]	Actual [W/m2]	How much of limit is used up
BTLE	2400	0.00282	3.3	2.14	0.00603	5.348	10.000	0.0120	0.224%

Note 1： Evaluated worst-case mode of operation, LE 2 Mbps
Note 2： The calculation is based on distance of 20cm and highest power

5.2 Conclusion:

The worst-case transmission mode of operation is LE 2 Mbps, which is using 0.224% of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Report Prepared by
2020-06-30	EMC_XIRGO-132-20001_FCC_ISED_MPE	Initial Release	Chin Ming Lui
2020-07-07	EMC_XIRGO-132-20001_FCC_ISED_MPE_REV1	Modified FCC ID & IC ID	Chin Ming Lui

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