Radio Frequency Exposure Evaluation Report

FOR:
Xirgo Technologies Inc.

Model Number:
XT1520-1

Product Description:
The customer is in need of proximity beacons to be utilized in conjunction with the Marimba XT4971/5 devices installed on the customer's trailers. The proximity beacons will be mounted to distribution carts that are used to move packages between customer's facilities via trailer. The carts are loaded at one facility, loaded onto a trailer, transported and unloaded at a different facility.

FCC ID: GKM-1520-1
IC ID: 10281A-15201

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_164_21001_FCC_ISED_MPE

DATE: 2021-08-16

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 #
Xirgo Technologies Inc.	The customer is in need of proximity beacons to be utilized in conjunction with the Marimba XT4971/5 devices installed on the customer's trailers. The proximity beacons will be mounted to distribution carts that are used to move packages between customer's facilities via trailer. The carts are loaded at one facility, loaded onto a trailer, transported and unloaded at a different facility.	XT1520-1

Report reviewed by: TCB Evaluator

Date	Section	Name	Signature
2021-08-16	Compliance	Kevin Wang (EMC Lab Manager)	kevin.wang@cetecom.com Digitally signed by: kevin.wang@cetecom.com DN: CN = kevin.wang@cetecom.com Date: 2021.08.16 13:49:07 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
2021-08-16	Compliance	Cheng Song (Associate Test Engineer)	cheng.song@cetecom.com Digitally signed by: cheng.song@cetecom.com DN: CN = cheng.song@cetecom.com Date: 2021.08.16 12:59:12 -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:	Kevin Wang
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:	XT1520-1
HW Version :	1520-1-001
SW Version :	1520-1-01
FCC ID:	GKM-1520-1
IC ID:	10281A-15201
Product Marketing Name (PMN):	Vuvuzela Proximity Beacon
Radios included in the device:	Bluetooth Low Energy (BLE): • Manufacturer: Nordic Semiconductor • Module Name: Bluetooth 5.2 SoC supporting Bluetooth Low Energy • Module Number: nRF52810 • Modes of operation: LE 1 Mbps & LE 2 Mbps in advertising mode.
Antenna Information as Declared:	Main Antenna: • Type: PCB • Location: Internal • Maximum Gain: 3.3 dBi • Frequency Band: 2.4 GHz ISM
Maximum Conducted Output Power:	Conducted Power 5.2 dBm
Power Supply/ Rated Operating Voltage Range:	2 x AA Batteries
Operating Temperature Range:	-20 ºC to 54 ºC
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**	MaxPower **W** conducted from module grant	MaxPower from module grant convert to **dBm**	Ant Gain dbi	Ant Gain lin	EIRP W calculated	Canda W/m2	US W/m 2	Actual W/m2	How much of limit is used up
BTLE	2402	0.00331	5.200	3.3	2.14	0.007	5.351	10.00 0	0.013	0.22%

Note1： Evaluated with worst case of operation LE 2 Mbps.
Note2： The calculation is based on the distance of 20cm

5.2 Conclusion:

The worst-case transmission is LE 2 Mbps, which is using 0.22% of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Prepared by
2021-07-29	EMC_XIRGO_164_21001_FCC_ISED_MPE	Initial Release	Cheng Song

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