Radio Frequency Exposure Evaluation Report

FOR:

Telular Corporation

Model:
GXT5002C

Product Description:
The GXT5002C is a solar powered GPS asset management solution that provides enhanced asset utilization and cargo visibility

Applied Rules and Standards:
CFR 47 Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISEDC RSS-102 Issue 5

FCC ID: MTFGXT5002C
IC ID: 2175D-GXT5002C

Report number: EMC_TELUL-076-19001_FCC_ISED_MPE

DATE: 2019-11-27

A2LA Accredited

IC recognized #
3462B-2

CETECOM **Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecom.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

Contents

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 #
Telular	The GXT5002C is a solar powered GPS asset management solution that provides enhanced asset utilization and cargo visibility	GXT5002C

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2019-11-27	Compliance	Cindy Li (Lab Manager EMC)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I am approving this document Location: Date: 2019-11-27 15:46:00

Responsible for the Report:

Date	Section	Name	Signature
2019-11-27	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: 2019.11.27 15:39:28 -08'00'

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 EMC:	Cindy Li
Responsible Project Leader:	Cathy Palacios

2.2. Identification of the Client

Applicant's Name:	Telular Corporation.
Street Address:	3225 Cumberland Blvd. Suite 300
City/Zip Code	Atlanta, GA 30339
Country	USA

2.3. Identification of the Manufacturer

Applicant's Name:	Same as Client
Street Address:	
City/Zip Code	
Country	

3. Equipment under Assessment

3.1. EUT Specifications

Firmware Version Identification Number (FVIN):	CM.00.01.1025
Hardware Version Identification Number (HVIN):	REV C
Product Marketing Name (PMN):	Falcon GXT5002C
Antenna (Primary & Diversity) Information as declared:	Ethertronics P822601, Peak Gain: 3.9 dBi
Other Radios included in the device:	❖ ISM • Module: SiLab EFR32 • Model Number: EFR32FG1P131F256GM32 • Modulation: 2GFSK • Main Antenna: ▪ Type: Small Helix ▪ Location: Internal ▪ Gain: 0.8 dBi ▪ Operating Frequency: 902 – 928 MHz ❖ GPS • Module: Quectel L80 • Antenna location: Internal
Power Supply/ Rated Operating Voltage Range:	Battery / Low 6.2 VDC, Nominal 12 VDC, High 17 VDC
Operating Temperature Range:	Low -30º C, High 70º C
Sample Revision	☐Prototype Unit; ■Production Unit; ☐Pre-Production
EUT Dimensions(inches):	1.5” (H) x 3.75” (W) x 21.5” (L)
Weight(lbs):	3 lbs
EUT Diameter	■ < 60 cm ☐ Other _____

Module Information	
Module Name:	Sierra Wireless
Model Number:	HL7688
FCC/IC ID:	FCC ID: N7NHL7688 IC ID: 2417C-HL7688
Frequency Band of Operation:	• FDD UMTS II: 1852.4 – 1907.6 MHz • FDD UMTS V: 826.4 – 846.6 MHz • LTE Band 2: 1850 – 1910 MHz • LTE Band 4: 1710 – 1755 MHz • LTE Band 5: 824 – 849 MHz • LTE Band 17: 704 – 716 MHz
Main Antenna:	Type: Ethertronics P822601 Location: Internal Peak Gain: • FDD UMTS Band II: 3.8 dBi • FDD UMTS Band V: 1.8 dBi • LTE Band 2: 3.8 dBi • LTE Band 4: 3.9 dBi • LTE Band 5: 1.8 dBi • LTE Band 17: 1.1 dBi

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 2.109(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);
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9);

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 to Exclude Routine RF Exposure evaluation for Stand Alone Operation

Band	Lowest Frequency [MHz]	FCC EIRP Limit	IC EIRP Limit in W	IC EIRP Limit in dBm	EIRP in dBm	Verdict
UMTS II	1850.00	36.900	2.24	33.50	28.8	Exempt
UMTS V	826.40	33.900	1.29	31.11	26.8	Exempt
LTE 2	1850.00	36.900	2.24	33.50	28.8	Exempt
LTE 4	1710.00	36.900	2.12	33.26	28.9	Exempt
LTE 5	824.00	33.900	1.29	31.11	26.8	Exempt
LTE 17	704.00	33.900	1.16	30.64	26.1	Exempt
ISM	902	33.900	1.37	31.37	21.16	Exempt

The single radios are exempt from routine environmental evaluation.

5.2 Analysis of RF Exposure for simultaneous transmission

Standalone MPE analysis:

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on EIRP measured or calculated from known gain and conducted output power.
- Cellular and ISM can transmit simultaneously

Radio	Freq MHz	EIRP in W	Canada W/m2	Actual W/m2	How much of limit is used up
UMTS II	1852.4	0.76	4.480	1.509	33.68%
UMTS V	826.4	0.48	2.581	0.952	36.89%
LTE 2	1857.5	0.76	4.489	1.509	33.62%
LTE 4	1717.5	0.78	4.255	1.544	36.29%
LTE 5	829	0.48	2.586	0.952	36.81%
LTE 17	704	0.41	2.313	0.810	35.04%
ISM	902	0.13	2.740	0.260	9.48%

Conclusion:

The worst case simultaneous transmission is UMTS V simultaneous with ISM which is using 36.89+9.48 = 46.37% of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

5.3 Routine Environmental Evaluation Applicability Simultaneous Transmission

Possible simultaneous transmissions: According to the manufacturer, the two radio modules incorporated within the device operate independently from each other. Theoretically, the worst case of simultaneous transmission is with two transmitters operating at the highest output power mode, within the same band (ISM+ Band 5).

Transmission Mode	Sum of the Ratios for the Highest Possible Simultaneous Operation	Limits for the Highest Combined Ratio	Exempt from Routine evaluation
ISM + UMTS V	0.095 + 0.369 = 0.46	< 1	Yes

Note: Power Density to Applicable limit for Stand Alone Operation are derived from table in section 5.2

Conclusion:

- The equipment meets the MPE requirements limits for simultaneous transmission for distance greater than or equal to 20 cm.

5. Revision History

Date	Report Name	Changes to report	Report prepared by
2019-11-27	EMC_TELUL-076-19001_FCC_ISED_MPE	Initial version	Chin Ming Lui