Radio Frequency Exposure Evaluation Report

FOR
Synapse Product Development

Marketing Name
Bike Interface Module

Model Name
BIT-01-0-9

Product Description
The Lyft BIM is an LTE connectivity, location and NFC card reader module for use on battery powered shared electric vehicles.

FCC ID: **2ASMP0109**

Applied Rules and Standards:
CFR 47 Part 2.1093
FCC KDB 447498 D01 General RF Exposure Guidance v06

Test Report #: SAR_EX_SYNAP_035_19001_FCC

DATE: 5/29/2019

A2LA Accredited

IC recognized # 3462B-2

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1 Assessment

The following device was evaluated against the limits for general population uncontrolled exposure specified in CFR 47 Part 2.1093 according to SAR evaluation exclusion requirements specified in FCC regulation as listed in KDB 447498.

Responsible for Testing Laboratory:

Date	Section	Name	Signature
5/29/2019	Compliance	Kris Lazarov (Sr. EMC Engineer)	Digitally signed by Kris Lazarov Date: 2019.05.30 10:50:12 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
5/29/2019	Compliance	Ghanma, Issa (EMC Engineer)	Digitally signed by: Issa Ghanma DN: CN = Issa Ghanma email = issa.ghanma@cetecom.com C = US O = CETECOM INC. OU = EMC Date: 2019.05.30 10:51:15 -07'00'

The test results of this test report relate exclusively to the test item specified in Section3.
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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
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Compliance Manager:	Li, Cindy
Responsible Project Manager:	Cathy Palacios

2.2 Identification of the Client

Applicant's Name:	Synapse Product Development
Street Address:	640 Bryant St
City/Zip Code	San Francisco, CA 94107
Country	USA

2.3 Identification of the Manufacturer

Applicant's Name:	Lyft, Inc.
Street Address:	185 Berry St Suite 5000
City/Zip Code	San Francisco, CA 94107
Country	USA

3 Equipment under Assessment

Model #:	BIT-01-0-9
Hardware Version:	1.0
Software Version:	1.0
Minimum distance of antenna or radiating parts to user	5mm
Radios included in the device:	❖ Cellular 4G LTE CAT-1 • Module name: Digi XBee Cellular LTE Cat 1 • Module number: XBC-V1-UT-001 • FCC ID: RI7LE866SV1 • IC ID: 5131A-LE866SV1 ❖ NFC Module: • 13.56 MHz Transceiver (TRF7960ARHBT) ❖ WLAN(Wi-Fi): 802.11 b/g/n (Receive only) • Module name: Stand-alone Wi-Fi • Model number: uBlox NINA-W132 • FCC ID: XPYNINAW13 ❖ GPS: • Module name: uBlox M8 GNSS Antenna Module • Model number: uBlox SAM-M8Q
Co-located Transmitters/ Antennas:	■ Yes ☐ No
Exposure Category:	☐ Occupational/ Controlled ■ General Population/ Uncontrolled
Device Category:	☐ Fixed Installation ☐ Mobile ☐ Portable ■ Mixed Mobile and Portable
Power Supply/ Rated Operating Voltage Range:	Low 30 VDC, Nominal 36 VDC, High 42 VDC
Operating Temperature Range:	Low -20^{o} C, Nominal 25^{o} C, High 50^{o} C
Sample Revision	☐Prototype Unit; ■Production Unit; ☐Pre-Production
EUT Dimensions [cm]:	270 x 70 x 40
Weight (grams) :	400
EUT Diameter:	■ < 60 cm ☐ Other _____

4 FCC Exemption Limits for Routine Evaluation

4.1 FCC SAR test exclusions are set by KDB 447498 D01 General RF Exposure Guidance v06

4.1.1 Section: 4.3.1. Standalone SAR test exclusion considerations

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:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)]
≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, where

- f(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
- The values 3.0 and 7.5 are referred to as *numeric thresholds* in step b) below

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 4.1 f) 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):[32]

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

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

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(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 ½

4.1.2 Section 4.3.2 Simultaneous transmission SAR test exclusion considerations

Simultaneous transmission 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.

5 SAR Exclusion Evaluation

5.1 Standalone

FCC Standalone Transmission SAR Exclusion Calculations @ 5mm								
Radio	**Frequency [GHz]**	**Maximum output power** *1 **[dBm]**	**Gain [dBi]**	**EIRP** *2 **[dBm]**	**Applying duty cycle correction factor** *3 **[dBm]**	**Corrected power [mW]**	**Threshold** *4	**Percentage of limit used up [%]**
LTE 4	1.72 – 1.745	23.43	3.05	26.48	8.95	7.9	2.1	70
LTE 13	0.7795 – 0.7845	23.62	- 0.21	23.41	5.88	3.9	0.7	23
NFC	0.01356	18.0	-	-	15.16	32.8	0.7	23

*1 Maximum output power from the modular grant or client declaration, whichever is the highest.

*2 Adding the peak gain value to the maximum power.

*3 Subtracting 10 * Log (1/ Duty Cycle %) from either EIRP, or power declared by client, whichever is the highest, to establish the worst case.

For cellular radio, client declared that the transmitter sends a pulse once every 5000 milliseconds. The pulse length 88.4 milliseconds to send a packet size of 200 bytes.

For NFC radio, (52%) duty cycle were measured and averaged over 6 minutes, using EMPower ETSI Burst Measurement System.

*4 Formula used for threshold calculation described in section 4.1 a) for cellular radio, and in section 4.1 c) 2) of this report, for the NFC radio.

5.2 Simultaneous transmission

The worst case simultaneous transmission for this devise is LTE 4 simultaneous with NFC radio. This configuration is using only up to 93% of the limit – see table in section 5.1 for details.

Conclusion: The sum of 1-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit.

6 Revision History

Date	Report Name	Changes to report	Report prepared by
5/29/2019	SAR_EX_SYNAP_035_19001_FCC	Initial Version	Ghanma, Issa