REGULATORY VERIFICATION TEST REPORT

FCC CFR 47 Part 15.247, ISED 15.247 Issue 2

Report No.: LYFT08-U3/U5 Rev A

Company: Lyft, Inc

Model Name: BIT041B

REGULATORY VERIFICATION TEST REPORT

Company Name: Lyft, Inc

Model Name: BIT041B

To: FCC CFR 47 Part 15 Subpart C 15.247 (DTS), ISED RSS-247 Issue 2

Test Report Serial No.: LYFT08-U3/U5 Rev A

This report supersedes: NONE

Applicant: Lyft, Inc
185 Berry St #5000
San Francisco, California 94107
USA

Issue Date: 28th July 2021

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
575 Boulder Court
Pleasanton California 94566
USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com

A2LA ACCREDITED
TESTING CERT #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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MiCOM Labs, 575 Boulder Court, Pleasanton, California 94566 USA, Phone: +1 (925) 462 0304, Fax: +1 (925) 462 0306, www.micomlabs.com

1. ACCREDITATION, LISTINGS & RECOGNITION

1.1. TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard ISO/IEC 17025:2017. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

Accredited Laboratory

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 24th day of February 2020.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2021

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

1.2. RECOGNITION

MiCOM Labs, Inc is widely recognized for its wireless testing and certification capabilities. In addition to being recognized for Testing and Certification under Phase 2 Mutual Recognition Agreements (MRA) with Canada, Europe, United Kingdom and Japan, our international recognition includes Conformity Assessment Body (CAB) designation status under agreements with Asia Pacific (APEC) MRA Phase 1 countries giving acceptance of MiCOM Labs test reports. MiCOM Labs test reports are accepted globally.

Country	Recognition Body	Status	MRA Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 Test Firm Designation#: US1084
Canada	Industry Canada (ISED)	FCB	APEC MRA 2	US0159 ISED#: 4143A
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	Japan MRA 2	RCB 210
	Japan Approvals Institute for Telecommunication Equipment (JATE)			
	VCCI	--	--	A-0012
Europe	European Commission	NB	EU MRA 2	NB 2280
United Kingdom	Department for Business, Energy & Industrial Strategy (BEIS)	AB	UK MRA 2	AB 2280
Mexico	Instituto Federal de Telecomunicaciones (IFT)	CAB	Mexico MRA 1	US0159
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)			
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)			
Singapore	Infocomm Development Authority (IDA)			
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)			
Vietnam	Ministry of Communication (MIC)			

TCB – Telecommunications Certification Bodies (TCB)
FCB – Foreign Certification Body
CAB – Conformity Assessment Body
NB – Notified Body
AB – Approved Body

MRA – Mutual Recognition Agreement
MRA Phase I - recognition for product testing
MRA Phase II – recognition for both product testing and certification

1.3. PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard ISO/IEC 17065:2012. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

Accredited Product Certification Body

A2LA has accredited

MiCOM LABS

Pleasanton, CA

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC 17065:2012 *Requirements for bodies certifying products, processes and services*. This product certification body also meets the *A2LA R322 – Specific Requirements – Notified Body Accreditation Requirements* and *A2LA R308 - Specific Requirements - ISO-IEC 17065 - Telecommunication Certification Body Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a management system.

Presented this 24th day of February 2020

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2021

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

United States of America – Telecommunication Certification Body (TCB)
Industry Canada – Certification Body, CAB Identifier – US0159
Europe – Notified Body (NB), NB Identifier - 2280
UK – Approved Body (AB), AB Identifier - 2280
Japan – Recognized Certification Body (RCB), RCB Identifier - 210

2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	25th July 2021	Draft report for client review. This report is an update to LYFT06-Rev A 20th April 2021, see Section 5.2 Scope of Test Program for device modifications.
Rev A	28th July 2021	Initial Release

In the above table the latest report revision will replace all earlier versions.

3. TEST RESULT CERTIFICATE

Manufacturer:	Lyft, Inc 185 Berry St #5000 San Francisco California 94107 USA	**Tested By:**	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model:	BIT041B	**Telephone:**	+1 925 462 0304
Equipment Type:	E-Bike Location and Control Unit	**Fax:**	+1 925 462 0306
S/N's:	Conducted: FK2127CMLB3NC0002 Radiated: FK2114CVCU2NC0155		
Test Date(s):	21st July 2021	**Website:**	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart C 15.247 ISED RSS-247	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.

2. Details of test methods used have been recorded and kept on file by the laboratory.

3. Test results apply only to the item(s) tested.

A2LA ACCREDITED
TESTING CERT #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs, Inc.

Gordon Hurst
President & CEO MiCOM Labs, Inc.

4. REFERENCES AND MEASUREMENT UNCERTAINTY

4.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
I	KDB 662911 D01 & D02	Oct 31 2013	Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band
II	KDB 558074 D01 v05r02	2nd April 2019	Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices operating under section 15.247 of the FCC Rules.
III	A2LA	5th October 2020	R105 - Requirement's When Making Reference to A2LA Accreditation Status
IV	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
V	ANSI C63.4	2014	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
VI	CISPR 32	2015	Electromagnetic compatibility of multimedia equipment - Emission requirements
VII	ETSI TR 100 028	2001-12	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
VIII	FCC 47 CFR Part 15.247	2020	Radio Frequency Devices; Subpart C – Intentional Radiators
IX	ICES-003	Issue 7; October 15,2020	Information Technology Equipment (Including Digital Apparatus) – Limits and methods of measurement.
X	M 3003	Edition 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
XI	RSS-247 Issue 2	Feb 2017	Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices
XII	RSS-Gen Issue 5	2018	General Requirements for Compliance of Radio Apparatus. With Amendments 1: March 2019 and 2: Feb 2021.
XIII	FCC 47 CFR Part 2.1033	2020	FCC requirements and rules regarding photographs and test setup diagrams.
XIV	KDB 789033 D02 V02r01	14th December, 2017	Guidelines For Compliance Testing Of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E

4.2. Test and Uncertainty Procedure

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

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5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Technical Details

Details	Description
Purpose:	Test of the Lyft, Inc BIT041B to FCC CFR 47 Part 15 Subpart C 15.247, ISED RSS-247 Issue 2.
Applicant:	Lyft, Inc 185 Berry St #5000 San Francisco California 94107, USA
Manufacturer:	Lyft, Inc
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	LYFT08-U3/U5
Date EUT received:	20th July 2021
Standard(s) applied:	FCC CFR 47 Part 15 Subpart C 15.247 ISED RSS-247 Issue 2
Dates of test (from - to):	20th July 2021
No of Units Tested:	2
Product Family Name:	VCU
Model(s):	BIT041B
Marketing Name:	VCU
Location for use:	Indoors/Outdoor
Declared Frequency Range(s):	2400 - 2483.5 MHz
Type of Modulation:	BLE: GFSK, 2.4 WiFi: CCK, OFDM
EUT Modes of Operation:	BLE: DTS, WiFi: 802.11b; g; HT-20; HT-40
Declared Nominal Output Power (dBm):	BLE:+8 dBm, WiFi: +19.10 dBm
Rated Input Voltage and Current:	48VDC / 1A Battery
Operating Temperature Range:	-20ºC to +50ºC
Equipment Dimensions:	15.75cm x 8.8cm x 5.5cm
Weight:	360 grams
Hardware Rev:	A
Software Rev:	16b00bc1d102c

5.2. Scope Of Test Program

Lyft, Inc BIT041B

The scope of the test program was to verify the Lyft, Inc BIT041B BLE and 2.4G WiFi radio modifications from previous product release in the frequency range 2400 - 2483.5 MHz; for compliance against the following specifications:

FCC CFR 47 Part 15 Subpart C 15.247 (DTS)
Radio Frequency Devices; Subpart C – Intentional Radiators

ISED RSS-247 Issue 2
Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices

Note: the WiFi Module used in this equipment was previously tested in TA Technology report # R2009A0623-R1V2.

The BLE Module was previously tested at MiCOM Labs, Test Report LYFT06-U5 Rev A, Date 20th April 2021

Please see these respective reports for full testing of the radios.

This verification report was only to verify the continued compliance of the Lyft Inc. BIT041B. As a result of the device modification testing was limited to digital and radiated emissions.

Device Modifications

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Device Modifications

DocuSign Envelope ID: 536CA031-C8E3-4458-9399-F2E1C85618C0

185 Berry Street
Suite 5000
San Francisco, CA 94107

Office of Engineering Technology
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046
USA

Date: 7/28/2021

Subject: Description of Hardware Changes
FCC ID: 2ASMP-BIT041B

To Whom It May Concern,

The test reports for 2ASMP-BIT041B (Model BIT041B) make reference to measurements conducted on a previous version of the hardware design (tested under FCC ID 2ASMP-BIT040B, model BIT040B). The performance of model BIT041B is believed to be fundamentally similar to model BIT040B, and this was verified using spot checks in expected worst case scenarios.

The electrical changes between the two models are expected to have a minimal effect on the radiated and conducted RF measurements on the modules. The changes between model BIT040B and BIT041B are summarized on the next page.

There are no design changes on the RF path for the LTE, BLE, and WiFi transceivers; the emissions results for these transceivers are expected to be similar to those from the BIT040B test report.

There are changes in the RF path for the NFC transceiver, but the resulting emissions are expected to be similar to those from the BIT040B test report.

List of Changes

1. NFC PCBA (VCU_NFC)
    a. Remove series 0-ohm resistors (R14 & R16) on the NFC antenna path and replace them with PCB traces. Add test points on NFC antenna traces (ANT1 & ANT2).
    b. Remove excess GND polygon in the J3 area.
    c. Remove series 0-ohm resistor R10 and replace with a PCB trace.
    d. Remove series 0-ohm resistor R23 and replace with a PCB trace.
    e. Remove I2C address resistors (R3, R6, R7, and R8) and replace them with PCB traces to GND.
    f. Rename components FB1 and FB2 to L2 and L4 (respectively). Rotate L2 90 degrees in layout.
    g. Update bypass components on display connector to match vendor recommendation.
2. Main PCBA (VCU_MLB)
    a. Add vias to LTE antenna (U0410, U0470) mechanical mounting pads.
    b. Change L1440 and L1441 to a different ferrite bead (Murata NFZ18SM701SN10D).
    c. Change board revision resistors (R1018, R1019) to different resistance values.
    d. Change R0942 to a different resistance value to prevent power supply brownout.
    e. Connect the STATUS and RESET pins on the LTE module (U0100) to the main MCU (U0200). Add R0342, Q0341, and R0343 to make this connection.

Sincerely,

Name: Nik Hatzis
Title: Director, Micromobility Compliance and Safety

5.3. Equipment Model(s) and Serial Number(s)

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr.	Model No.	Serial No.
EUT	E-Bike Location and Control Unit	Lyft Inc	BIT041B	Conducted: FK2127CMLB3NC0002 Radiated: FK2114CVCU2NC0155
Support	Laptop	Lenovo	N/A	N/A

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
Integral (BLE)	Taoglas	WLA.01	Chip	2.5	--	--	--	2400 - 2483.5
Integral (WiFi)	Espressif	ESP32-S2-MINI-1	F Type	3.92	--	--	--	2400 - 2483.5

BF Gain - Beamforming Gain
Dir BW - Directional BeamWidth
X-Pol - Cross Polarization

5.5. Cabling and I/O Ports

Port Type	Max Cable Length	Conn Type	Environment
Discrete I/O	<3m	Higo L810 CG	End-User|
Analog	<3m	Higo L309 CM	End-User|
Analog	<3m	Higo L609 CM	End-User|
CAN+DC IN	<3m	Higo L409 CG	End-User|
Power + Digital I/O	<3m	Higo L509 CM	End-User|

5.6. Test Configurations

Results for the following configurations are provided in this report:

Operational Mode		Channel Frequency (MHz)		
		Low	Mid	High
2400.0 – 2483.5 MHz				
BLE		2404.00	--	--
2.4G WiFi		--	2430.00	--
LTE		--	836.5	--

5.7. Equipment Modifications

The following modifications were required to bring the equipment into compliance:
1. NONE

5.8. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:
1. NONE

6. TEST SUMMARY

List of Measurements

Test Header	Result	Data Link
(i) TX Spurious & Restricted Band Emissions	Complies	View Data
(ii) Restricted Edge & Band-Edge Emissions	Complies	View Data
(iii) Digital Emissions (0.03 - 1 GHz)	Complies	View Data
(iv) AC Wireline Emissions	No requirement modules are Vdc	

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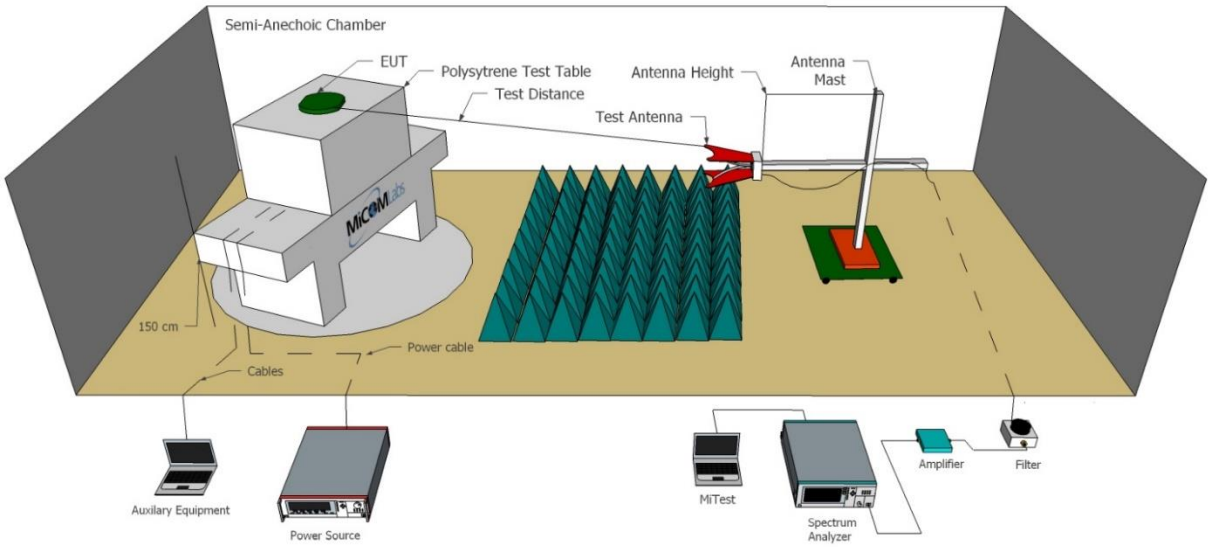
7. TEST EQUIPMENT CONFIGURATION(S)

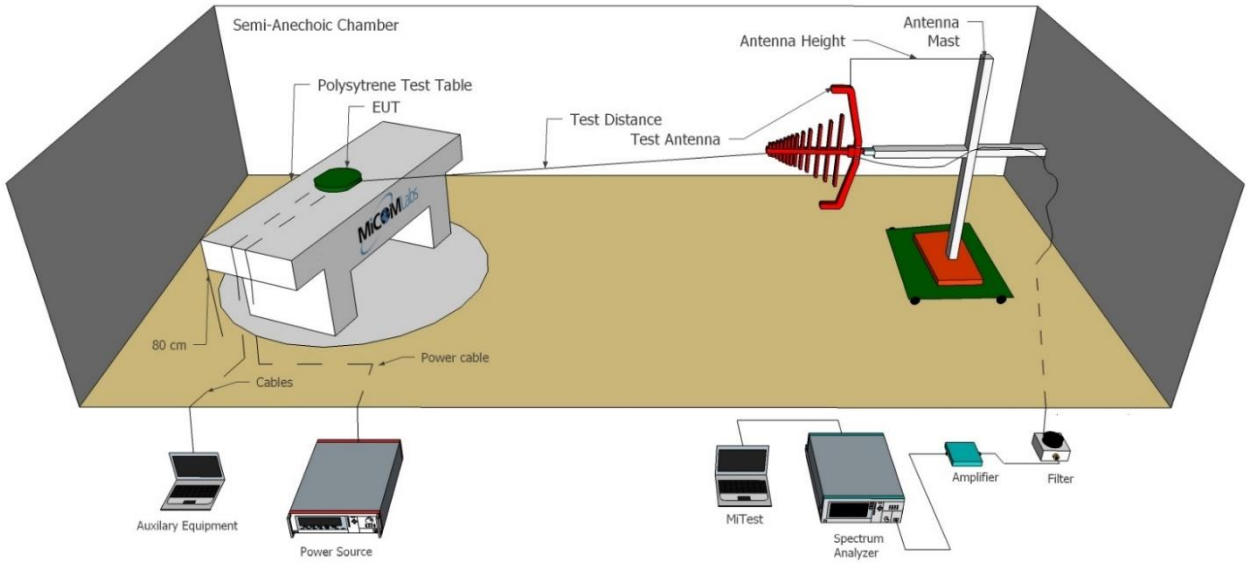
7.1. Radiated Emissions - 3m Chamber

The following tests were performed using the radiated test set-up shown in the diagram below. Radiated emissions above and below 1GHz.

Radiated Emissions Above 1GHz Test Setup



Radiated Emissions Below 1GHz Test Setup



Test Equipment Utilized

A full system calibration was performed on the test station and any resulting system losses (or gains) were considered in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CU101	04R08507	Not Required
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	8 Oct 2021
298	3M Radiated Emissions Chamber Maintenance Check	MiCOM	3M Chamber	298	26 Sep 2021
336	Active loop Ant 10kHz to 30 MHz	EMCO	EMCO 6502	00060498	29 Nov 2021
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	4 Oct 2021
346	1.6 TO 10GHz High Pass Filter	EWT	EWT-57-0112	H1	4 Sep 2021
373	26III RMS Multimeter	Fluke	Fluke 26 series III	76080720	21 Sep 2021
396	2.4 GHz Notch Filter	Microtronics	BRM50701	001	4 Sep 2021
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	9 Sep 2021
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	12 Sep 2021
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	9 Sep 2021
410	Desktop Computer	Dell	Inspiron 620	WS38	Not Required
411	Mast/Turntable Controller	Sunol Sciences	SC98V	060199-1D	Not Required
412	USB to GPIB Interface	National Instruments	GPIB-USB HS	11B8DC2	Not Required
413	Mast Controller	Sunol Science	TWR95-4	030801-3	Not Required
414	DC Power Supply 0-60V	HP	6274	1029A01285	Cal when used
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
447	MiTest Rad Emissions Test Software	MiCOM	Rad Emissions Test Software Version 1.0	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	4 Sep 2021
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	4 Sep 2021
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	4 Sep 2021
465	Low Pass Filter DC-1000 MHz	Mini-Circuits	NLP-1200+	VUU01901402	4 Sep 2021
466	Low Pass Filter DC-	Mini-Circuits	NLP-1750+	VUU10401438	4 Sep 2021

	1500 MHz				
467	2495 to 2650 MHz notch filter	MicroTronics	BRM50709	011	4 Sep 2021
480	Cable - Bulkhead to Amp	SRC Haverhill	157-3050360	480	23 Jun 2022
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-3050787	481	23 Jun 2022
510	Barometer/Thermometer	Control Company	68000-49	170871375	20 Dec 2021
554	Precision SMA Cable	Fairview Microwave	SCE18060101-400CM	554	23 Jun 2022
CC05	Confidence Check	MiCOM	CC05	None	4 Sep 2021

8. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy-to-read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Data'.

Test and report automation was performed by MiTest. MiTest is an automated test system developed by MiCOM Labs. MiTest is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing for conducted RF testing.

The MiCOM Labs "MiTest" Automated Test System" (Patent Pending)

9. TEST RESULTS

9.1. Emissions

9.1.1. Radiated Emissions

9.1.1.1. TX Spurious & Restricted Band Emissions

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions (Restricted Bands)			
Standard:	FCC CFR 47 Part 15.247 ISED RSS-247	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious and Band-Edge Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.205, 15.209 Sect 5.5	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions (Restricted Bands)
Radiated emissions for restricted bands above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned. Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Test configuration and setup for Radiated Spurious and Band-Edge Measurement were per the Radiated Test Set-up specified in this document.

Orientation testing of the EUT was performed and the EUT standing upright was determined to be the worst case for Spurious and Band Edge emissions with the integral antennas attached.

Limits for Restricted Bands
Peak emission: 74 dBuV/m
Average emission: 54 dBuV/m

Average Measurements were performed following ANSI C63.10 section11.12.2.5.2 Trace averaging across on and off times of the EUT transmissions followed by a duty cycle correction.
RMS detector used, DCCF of 10log (1/D) where D is the Duty Cycle.

Field Strength Calculation
The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.
FS = R + AF + CORR - FO

where:
FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

Example:
Given receiver input reading of 51.5 dBmV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength (FS) of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBmV/m

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:
Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m
48 dBmV/m = 250 mV/m

Restricted Bands of Operation (15.205)
(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Frequency Band			
MHz	**MHz**	**MHz**	**GHz**
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to §15.213.

(4) Any equipment operated under the provisions of §15.253, 15.255, and 15.256 in the frequency band 75-85 GHz, or §15.257 of this part.

(5) Biomedical telemetry devices operating under the provisions of §15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

(6) Transmitters operating under the provisions of subparts D or F of this part.

(7) Devices operated pursuant to §15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.

(8) Devices operated in the 24.075-24.175 GHz band under §15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in §15.245(b).

(9) Devices operated in the 24.0-24.25 GHz band under §15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in §15.249(a).

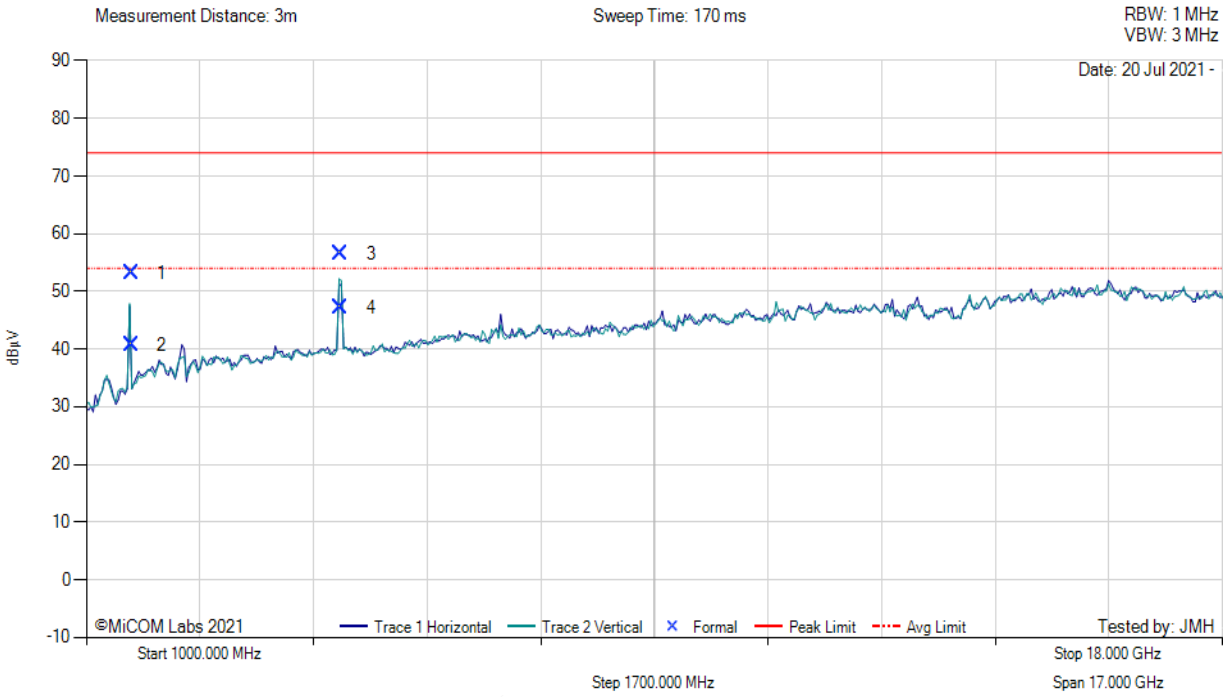
(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of §15.245 shall not exceed the limits specified in §15.245(b).

Equipment Configuration for TX Spurious & Restricted Band Emissions

Antenna:	Taoglas WLA.01	**Variant:**	NFC, BLE, Wi-Fi, LTE
Antenna Gain (dBi):	2.50	**Modulation:**	ASK, GFSK, CCK, QPSK
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50 (BLE lowest)
Channel Frequency (MHz):	836.5, 2404.00, 2430.00	**Data Rate:**	
Power Setting:	Max	**Tested By:**	JMH

Test Measurement Results

Variant: LTE, Test Freq: 836.50 MHz, Power Setting: Max, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	1670.57	67.67	1.67	-16.17	53.17	Max Peak	Vertical	122	203	74.0	-20.8	Pass
2	1670.57	55.20	1.67	-16.17	40.70	Max Avg	Vertical	122	203	54.0	-13.3	Pass
3	4808.44	66.08	2.85	-12.43	56.50	Max Peak	Vertical	130	313	74.0	-17.5	Pass
4	4808.44	53.77	2.85	-12.43	47.19	Max Avg	Vertical	130	313	54.0	-6.8	Pass

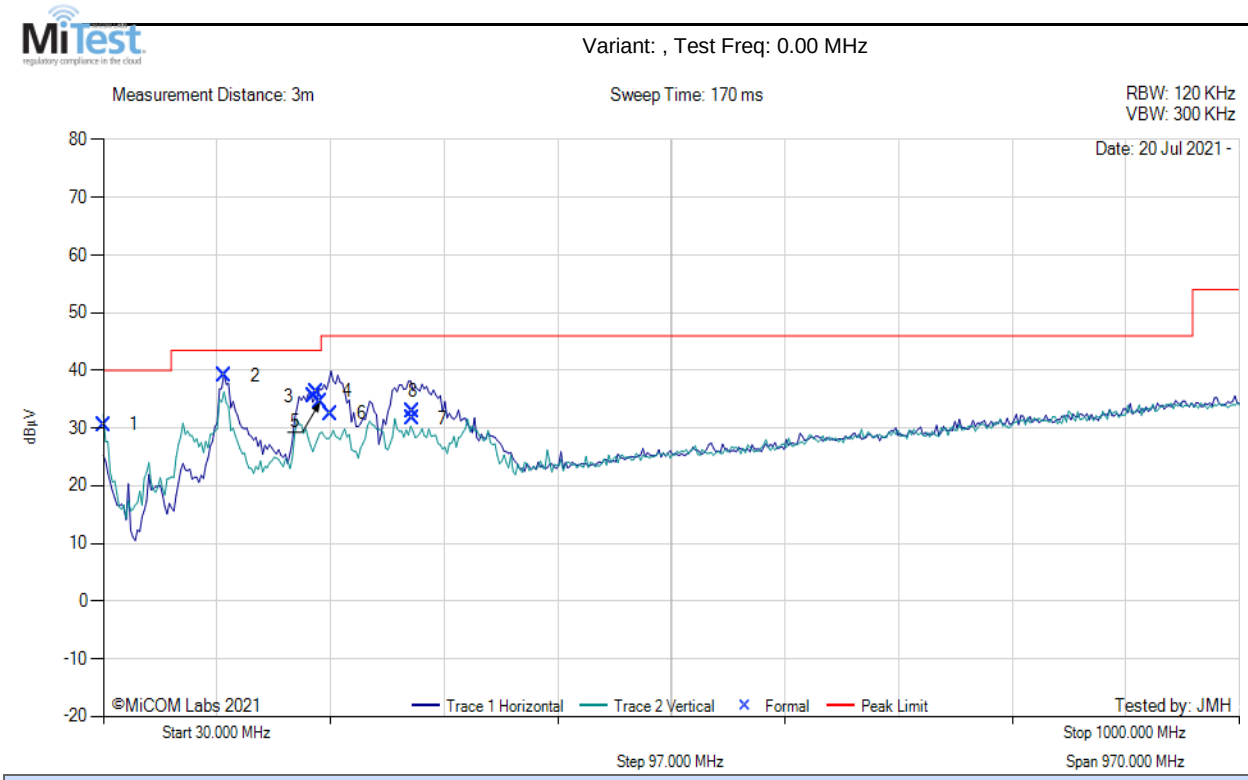
Test Notes: COSMO VCU powered by 48 V DC. LTE Call up Band 5, BLE and Wi-Fi active.2.4 notch in front of amp to prevent overload. DCCF 3 dB added to 4.8 Mhz Signal to Average Measurement (Bluetooth).

9.1.2. Digital Emissions (0.03 - 1 GHz)

Equipment Configuration for Radiated Digital Emissions (Class B)

Antenna:	Integral	**Variant:**	NFC, BLE, Wi-Fi, LTE
Antenna Gain (dBi):	Not Applicable	**Modulation:**	ASK, GFSK, CCK, QPSK
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	50 (BLE lowest)
Channel Frequency (MHz):	836.5, 2404.0, 2462.0	**Data Rate:**	
Power Setting:	Max	**Tested By:**	JMH

Test Measurement Results



30.00 - 1000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB/m**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	30.43	35.22	3.54	-8.20	30.56	MaxQP	Vertical	98	38	40.0	-9.4	Pass
2	133.68	49.67	4.23	-14.82	39.08	MaxQP	Horizontal	248	319	43.5	-4.4	Pass
3	209.38	48.20	4.56	-17.31	35.45	MaxQP	Horizontal	138	276	43.5	-8.1	Pass
4	212.33	48.93	4.58	-17.21	36.30	MaxQP	Horizontal	144	281	43.5	-7.2	Pass
5	215.38	47.16	4.59	-17.10	34.65	MaxQP	Horizontal	112	267	43.5	-8.9	Pass
6	224.30	44.74	4.63	-16.89	32.48	MaxQP	Horizontal	149	289	46.0	-13.5	Pass
7	294.11	41.26	4.89	-14.53	31.62	MaxQP	Horizontal	109	272	46.0	-14.4	Pass
8	294.11	42.53	4.89	-14.53	32.89	MaxQP	Horizontal	101	258	46.0	-13.1	Pass

Test Notes: COSMO VCU powered by 48 V DC. LTE call band 5, Wi-Fi and BLE active

575 Boulder Court
Pleasanton, California 94566, USA
Tel: +1 (925) 462 0304
Fax: +1 (925) 462 0306
www.micomlabs.com