



## **VERIFICATION TEST REPORT**

**FCC Part 22, 24, 27  
IC RSS 130, 132, 133, 139**

**Report No.: LYFT08-U13 Rev A**

**Company:** Lyft, Inc.

**Model:** BIT041B

## VERIFICATION TEST REPORT

**Company:** Lyft, Inc.

**Model:** BIT041B

**Standard(s):** FCC Part 22, 24, 27 & ISSED RSS 130, 132, 133, 139

**Test Report Serial No.:** LYFT08-U13 Rev A

This report supersedes: NONE

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

**Issue Date:** 28<sup>th</sup> 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](http://www.micomlabs.com)



**MiCOM Labs is an ISO 17025 Accredited Testing Laboratory**

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## 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](http://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 24<sup>th</sup> 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<br>Test Firm<br>Designation#:<br>US1084 |
| Canada         | Industry Canada (ISED)                                                    | FCB    | APEC MRA 2   | US0159<br>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

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](http://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>



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

## 2. DOCUMENT HISTORY

| Document History |                            |                                 |
|------------------|----------------------------|---------------------------------|
| Revision         | Date                       | Comments                        |
| Draft            | 25 <sup>th</sup> July 2021 | Draft report for client review. |
| Rev A            | 28 <sup>th</sup> July 2021 | Initial Release                 |
|                  |                            |                                 |
|                  |                            |                                 |
|                  |                            |                                 |
|                  |                            |                                 |
|                  |                            |                                 |

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

### 3. TEST RESULT CERTIFICATE

|                                                                                               |                                                                                               |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Manufacturer:</b> Lyft, Inc<br>185 Berry St #5000<br>San Francisco<br>California 94107 USA | <b>Tested By:</b> MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton<br>California 94566 USA |
| <b>Model:</b> BIT041B                                                                         | <b>Telephone:</b> +1 925 462 0304<br><b>Fax:</b> +1 925 462 0306                              |
| <b>Equipment Type:</b> E-Bike Location and Control Unit                                       |                                                                                               |
| <b>S/N's:</b> FK2114CVCU2NC0155                                                               |                                                                                               |
| <b>Test Date(s):</b> 20 <sup>th</sup> July 2021                                               | <b>Website:</b> www.micomlabs.com                                                             |

| STANDARD(S)                                         | TEST RESULTS       |
|-----------------------------------------------------|--------------------|
| FCC Part 22, 24, 27 & IC RSS 130, 132, 133, 139 199 | 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.

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    | A2LA                         | October 2019       | R105 - Requirement's When Making Reference to A2LA Accreditation Status                                                                                                                                                                                                                                                                                                                                                                  |
| II   | 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                                                                                                                                                                                                                                                                                 |
| III  | M 3003                       | Edition 3 Nov.2012 | Expression of Uncertainty and Confidence in Measurements                                                                                                                                                                                                                                                                                                                                                                                 |
| IV   | KDB 412172 D01               | August 7, 2015     | EIRP and ERP are similarly defined as the product of the power supplied to the antenna and the antenna gain. The primary difference is that for ERP the antenna gain is expressed relative to an ideal half-wave dipole antenna, whereas with EIRP the antenna gain is expressed relative to an ideal (theoretical) isotropic antenna. EIRP and ERP can be expressed mathematically as described in the following sections. <sup>1</sup> |
| V    | RSS-130 Issue 2              | February 2019      | RSS-130 Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz                                                                                                                                                                                                                                                                                                                                 |
| VI   | RSS-132 Issue 3              | January 2013       | RSS-132 Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz                                                                                                                                                                                                                                                                                                                                                    |
| VII  | RSS-133 Issue 6, Amendment 1 | January 2018       | RSS-133 2GHz Personal Communications Services. This Radio Standards Specification (RSS) sets out the requirements for certification of transmitters and receivers used in radio communications systems to provide Personal Communications Services (PCS) in the bands 1850-1915 MHz and 1930-1995 MHz.                                                                                                                                   |
| VIII | RSS-139 Issue 3              | July 2015          | RSS-139 Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz                                                                                                                                                                                                                                                                                                                                |
| IX   | FCC Part 22H                 | April 8, 2021      | Subpart H – Cellular Radio Telephone Service:<br>The rules in this subpart govern the licensing and operation of cellular radiotelephone systems.<br>(a) Block A: 824-835 MHz and 845-846.5 MHz<br>(b) Block B: 835-845 MHz and 846.5-849 MHz                                                                                                                                                                                            |
| X    | FCC Part 24E                 | April 8, 2021      | Subpart E—Broadband PCS;<br>(c) This subpart sets out the regulations licensing and operations of personal communications services authorized in the 1850-1910 and 1930-1990 MHz bands.                                                                                                                                                                                                                                                  |
| XI   | FCC Part 27C, H              | April 8, 2021      | Miscellaneous Wireless Communications Services<br>This part .. for the provision of wireless communications services in the following bands.<br>(2) 746-758 MHz, 775-788 MHz, and 805-806 MHz.<br>(3) 698-746 MHz, 1710-1755 MHz                                                                                                                                                                                                         |

## **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.

## 5. PRODUCT DETAILS AND TEST CONFIGURATIONS

### 5.1. Technical Details

| Details                              | Description                                                                                           |
|--------------------------------------|-------------------------------------------------------------------------------------------------------|
| Purpose:                             | Test of the Lyft, Inc. BIT041B to requirements of FCC Part 22, 24E, 27C & ISED RSS-130, 132, 133, 199 |
| Applicant:                           | Lyft, Inc<br>185 Berry St #5000<br>San Francisco, California 94107, USA                               |
| Manufacturer:                        | Same as Applicant                                                                                     |
| Laboratory performing the tests:     | MiCOM Labs, Inc.<br>575 Boulder Court<br>Pleasanton California 94566, USA                             |
| Test report reference number:        | LYFT08-U13                                                                                            |
| Date EUT received:                   | 20 <sup>th</sup> July 2021                                                                            |
| Standard(s) applied:                 | FCC Part 22, 24E, 27C & ISED RSS-130, 132, 133, 199                                                   |
| Dates of test (from - to):           | 20 <sup>th</sup> July 2021                                                                            |
| No of Units Tested:                  | 1                                                                                                     |
| Type Of Equipment:                   | E-Bike Location and Control Unit                                                                      |
| Model(s):                            | BIT041B                                                                                               |
| Equipment Secondary Function(s):     | None                                                                                                  |
| Type of Technology:                  | E-Bike Location and Control Unit                                                                      |
| Installation type:                   | Mobile installation                                                                                   |
| Construction/Location for Use:       | Outdoor                                                                                               |
| Declared Frequency Range(s):         | LTE B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20<br>/B25/B26/B28/B38/B39/B40/B41                          |
| Type of Modulation:                  | QPSK, 64QAM, 256QAM                                                                                   |
| Declared Nominal Output Power (dBm): | 23                                                                                                    |
| Transmit/Receive Operation:          | Transceiver                                                                                           |
| Rated Input Voltage and Current:     | 48VDC / 1A Battery                                                                                    |
| Operating Temperature Range:         | -20°C to +50°C                                                                                        |
| 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 a verification test of the Lyft, Inc. BIT041B configurations with the pre-certified LTE Module in the specified frequency bands for compliance against the following IMT Cellular Network specifications:

#### **FCC Part 22 Subpart H – Cellular Radio Telephone Service**

The rules in this subpart govern the licensing and operation of cellular radiotelephone systems.

- (a) Block A: 824-835 MHz and 845-846.5 MHz
- (b) Block B: 835-845 MHz and 846.5-849 MHz

#### **FCC Part 24 Subpart E – Broadband PCS**

This subpart sets out the regulations governing the licensing and operations of personal communications services authorized in the 1850-1910 and 1930-1990 MHz bands.

#### **FCC Part 27 - Miscellaneous Wireless Communications Services**

This part states the conditions under which spectrum is made available and licensed for the provision of wireless communications services in the following bands... 746-758 MHz, 775-788 MHz, and 805-806 MHz, 698-746 MHz. 1710 - 1755 MHz

#### **Industry Canada RSS-130 Issue 2**

This Radio Standards Specification (RSS) sets out the requirements for equipment operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz bands.

#### **Industry Canada RSS-132 Issue 3**

RSS-132 Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz

#### **Industry Canada RSS-133 Issue 6**

RSS-133 2 GHz Personal Communications Services sets out the requirements for certification of transmitters and receivers used in radio communications systems to provide Personal Communications Services (PCS) in the bands 1850-1915 MHz and 1930-1995 MHz.

#### **Industry Canada RSS-139 Issue 3**

RSS-139 Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz

Pre-Certified LTE module tested by SGS-CSTC Standards Technical Services Co., Ltd Shenzhen;  
Test Report # HR/2019/10016E-0101, dated 7th May 2019.

### 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   | FK2114CVCU2NC0155 |
| Support            | Laptop                                       | Lenovo   | N/A       | N/A               |

### 5.4. External A.C/D.C. Power Adaptor

The BIT040B is powered via 48V Battery, no external ac/dc adaptor is used.

### 5.5. Antenna Details

| Type     | Manufacturer | Model   | Family | Gain (dBi) | BF Gain | Dir BW | X-Pol | Frequency Band (MHz) |
|----------|--------------|---------|--------|------------|---------|--------|-------|----------------------|
| integral | Taoglas      | PCS.06A | Chip   | -0.21      | -       | 360    |       | 698-803              |
| integral | Taoglas      | PCS.06A | Chip   | 0.77       | -       | 360    |       | 824-894              |
| integral | Taoglas      | PCS.06A | Chip   | 0.61       | -       | 360    |       | 880-960              |
| integral | Taoglas      | PCS.06A | Chip   | 3.05       | -       | 360    |       | 1710-1880            |
| integral | Taoglas      | PCS.06A | Chip   | 2.92       | -       | 360    |       | 1850-1990            |
| integral | Taoglas      | PCS.06A | Chip   | 3.17       | -       | 360    |       | 1920-2170            |
| integral | Taoglas      | PCS.06A | Chip   | 3.72       | -       | 360    | -     | 2500-2690            |

BF Gain - Beamforming Gain

Dir BW - Directional BeamWidth

X-Pol - Cross Polarization

### 5.6. 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    |

## 5.7. Test Configurations

Test configurations are as noted in the test results.

| LTE Band No. | Bandwidth (MHz) | Channels No.'s      | Frequencies (MHz)      |
|--------------|-----------------|---------------------|------------------------|
| 2            | 10              | 18650, 18900, 19150 | 1855.0, 1880.0, 1905.0 |
| 4            | 10              | 20000, 20175, 20350 | 1715.0, 1732.0, 1750.0 |
| 5            | 10              | 20450, 20525, 20610 | 829.0, 836.5, 845.0    |
| 12           | 10              | 23060, 23095, 23130 | 704.5, 707.5, 711      |
| 13           | 10              | 23230               | 782.0                  |

Verification Testing only of pre-certified module tested by; SGS-CSTC Standards Technical Services Co., Ltd Shenzhen.

Test Report # HR/2019/10016E-0101 Dated 7th May 2019.

| LTE Band | Test Report Appendix |
|----------|----------------------|
| 2        | B.3                  |
| 4        | B.4                  |
| 5        | B.5                  |
| 12       | B.7                  |
| 13       | B.8                  |

## 5.8. Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. NONE

## 5.9. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

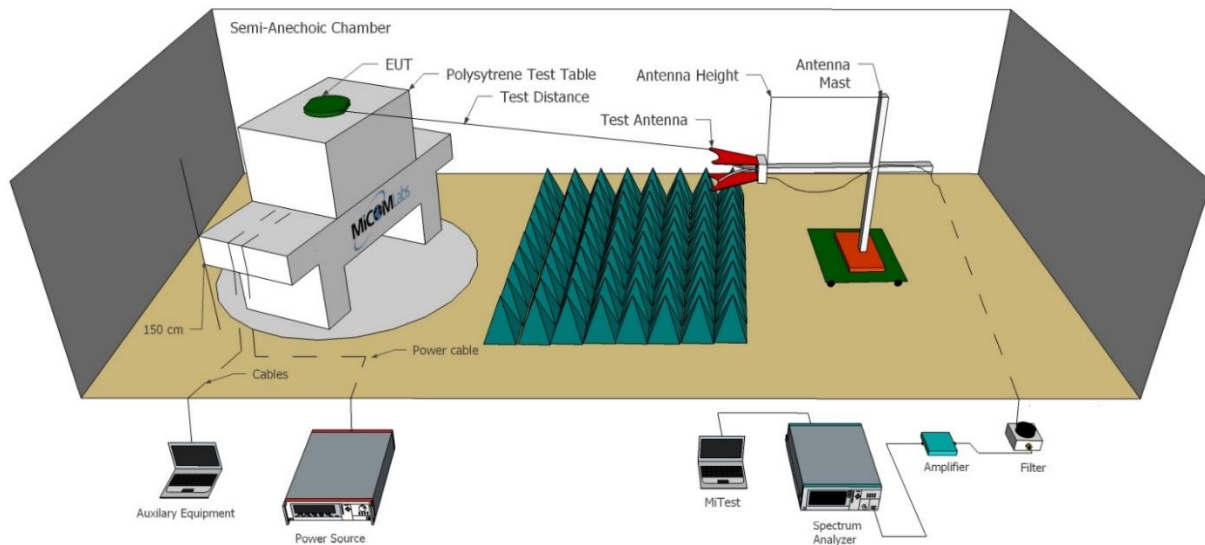
1. NONE

## 6. TEST EQUIPMENT CONFIGURATION(S)

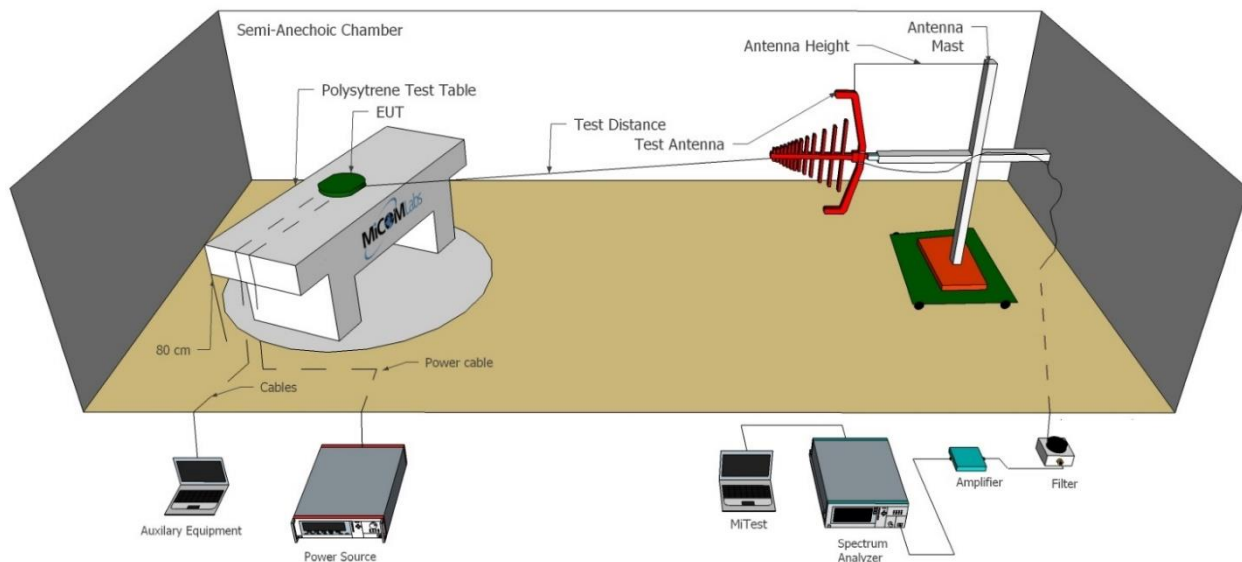
### 6.1. Radiated Emissions - 3m Chamber

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



| 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           |
| 338    | Sunol 30 to 3000 MHz Antenna                      | Sunol                | JB3                                     | A052907     | 4 Oct 2021           |
| 373    | 26III RMS Multimeter                              | Fluke                | Fluke 26 series III                     | 76080720    | 21 Jun 2021          |
| 397    | Amp 10 - 2500MHz                                  | MiCOM Labs           | Amp 10 - 2500 MHz                       | NA          | 9 May 2021           |
| 399    | ETS 1-18 GHz Horn Antenna                         | ETS                  | 3117                                    | 00154575    | 12 May 2021          |
| 406    | Amplifier for Radiated Emissions                  | MiCOM Labs           | 40dB 1 to 18GHz Amp                     | 0406        | 9 May 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 May 2021           |
| 463    | Schwarzbeck cable from Amplifier to Bulkhead.     | Schwarzbeck          | AK 9513                                 | 463         | 4 May 2021           |
| 464    | Schwarzbeck cable from Bulkhead to Receiver       | Schwarzbeck          | AK 9513                                 | 464         | 4 May 2021           |
| 466    | Low Pass Filter DC-1500 MHz                       | Mini-Circuits        | NLP-1750+                               | VUU10401438 | 4 May 2021           |
| 467    | 2495 to 2650 MHz notch filter                     | MicroTronics         | BRM50709                                | 011         | 4 May 2021           |
| 480    | Cable - Bulkhead to Amp                           | SRC Haverhill        | 157-3050360                             | 480         | 4 May 2021           |
| 481    | Cable - Bulkhead to Receiver                      | SRC Haverhill        | 151-3050787                             | 481         | 4 May 2021           |
| 510    | Barometer/Thermometer                             | Control Company      | 68000-49                                | 170871375   | 20 Dec 2021          |
| 518    | Cable - Amp to Antenna                            | SRC Haverhill        | 157-3051574                             | 518         | 4 May 2021           |

## 7. 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)

## 8. TEST SUMMARY

| Test Header                        | Result   | Data Link                 |
|------------------------------------|----------|---------------------------|
| <b>Transmitter Test Parameters</b> |          |                           |
| EIRP Emissions                     | Complies | <a href="#">View Data</a> |
| Transmitter Spurious Emissions     | Complies | <a href="#">View Data</a> |

**Note:** The EUT is a pre-certified module incorporated in a host with antennas. This report is a verification report of the pre-certified module in the host. For full testing of the module tested by; SGS-CSTC Standards Technical Services Co., Ltd Shenzhen refer to Test Report # HR/2019/10016E-0101 Dated 7th May 2019.

## 9. TEST RESULTS

### 9.1. Radiated Output Power

| Radiated Test Conditions for Output Power |                                                                                                                     |                            |             |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------|----------------------------|-------------|
| <b>Standard:</b>                          | FCC Part 22, 24E, 27C, H<br>IC RSS-130, 132, 133, 139                                                               | <b>Ambient Temp. (°C):</b> | 24.0 - 27.5 |
| <b>Test Heading:</b>                      | EIRP                                                                                                                | <b>Rel. Humidity (%):</b>  | 32 - 45     |
| <b>Standard Section(s):</b>               | FCC 22, FCC 24E: 24.232 (d)<br>FCC 27C: 27.50 (b), (d)<br>RSS-130: 4.6, RSS-132: 5.4,<br>RSS-133: 6.4, RSS-139: 6.5 | <b>Pressure (mBars):</b>   | 999 - 1001  |
| <b>Reference Document(s):</b>             | See Normative References                                                                                            |                            |             |

#### Test Procedure for Output Power

With reference to the test configuration identified in Section 6.1 Radiated Test Setup the EUT was set to transmit on the appropriate centre frequency of the selected frequency band and bandwidth. Output Power was measured on each of the active chain(s) (antenna outputs) using a power sensor connected to each antenna terminal.

Testing was performed under ambient conditions.

#### Limits Output Power - Band 2:

##### FCC 24E: §24.232

(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

##### RSS-133: 6.4 Transmitter Output Power and Equivalent Isotropically Radiated Power:

The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510.

#### Limits Output Power - Band 4,12,13:

##### FCC 27.50

(b) (10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(d)(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

##### RSS-130: 4.6 Transmitter Output Power and Effective Radiated Power:

For base and fixed equipment other than fixed subscriber equipment, refer to SRSP-518 for the e.i.r.p. limits.

##### RSS-139: 6.6 Transmitter Output Power and Effective Radiated Power:

The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt.

#### Limits Output Power - Band 5:

**FCC 22.913:** (5): The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

##### RSS-132: 5.4: Transmitter Output Power and Effective Radiated Power:

The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base station e.i.r.p. limits.

#### Band 4: Effective Radiated Power

| Equipment Configuration for Output Power |       |                                   |                |
|------------------------------------------|-------|-----------------------------------|----------------|
| <b>Band:</b>                             | 4     | <b>Duty Cycle (%):</b>            | 99.00          |
| <b>Modulation:</b>                       | QPSK  | <b>Antenna Gain (dBi):</b>        | Not Applicable |
| <b>Temperature (°C):</b>                 | +20.0 | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>Voltage (Vdc):</b>                    | 48.0  | <b>Tested By:</b>                 | JMH            |
| <b>Engineering Test Notes:</b>           | None  |                                   |                |

| Bandwidth (MHz) | Chanel # | Frequency (MHz) | RB (Starting) | RB # | EIRP (dBm)            | ERP   | EIRP Limit (dBm) | Margin (dB) |
|-----------------|----------|-----------------|---------------|------|-----------------------|-------|------------------|-------------|
| 10              | 20175    | 1732.5          | 0             | 50   | <a href="#">18.73</a> | 16.53 | 30.00            | -11.27      |

| Traceability to Industry Recognized Test Methodologies |                                 |
|--------------------------------------------------------|---------------------------------|
| <b>Work Instruction:</b>                               | WI-01 MEASURING RF OUTPUT POWER |
| <b>Uncertainty:</b>                                    | 1.33 dB                         |

Click in Links above to see plots

## Band 12: Effective Radiated Power

| Equipment Configuration for Output Power |       |                                   |                |
|------------------------------------------|-------|-----------------------------------|----------------|
| <b>Band:</b>                             | 12    | <b>Duty Cycle (%):</b>            | 99.00          |
| <b>Modulation:</b>                       | QPSK  | <b>Antenna Gain (dBi):</b>        | Not Applicable |
| <b>Temperature (°C):</b>                 | +20.0 | <b>Beam Forming Gain (Y)(dB):</b> | Not Applicable |
| <b>Voltage (Vdc):</b>                    | 48.0  | <b>Tested By:</b>                 | JMH            |
| <b>Engineering Test Notes:</b>           | None  |                                   |                |

| Bandwidth (MHz) | Chanel # | Frequency (MHz) | RB (Starting) | RB # | EIRP (dBm)            | ERP  | EIRP Limit (dBm) | Margin (dB) |
|-----------------|----------|-----------------|---------------|------|-----------------------|------|------------------|-------------|
| 10              | 23095    | 707.5           | 0             | 50   | <a href="#">13.90</a> | 11.7 | 34.77            | -21.87      |

| Traceability to Industry Recognized Test Methodologies |                                 |
|--------------------------------------------------------|---------------------------------|
| <b>Work Instruction:</b>                               | WI-01 MEASURING RF OUTPUT POWER |
| <b>Uncertainty:</b>                                    | 1.33 dB                         |

Click in Links above to see plots

## 9.2. Radiated Transmitter Emissions

| Radiated Test Conditions for Transmitter Spurious Emissions |                                                                                                                                    |                            |             |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------|
| <b>Standard:</b>                                            | FCC Part 22, 24E, 27C, IC RSS-130, 132, 133, 139                                                                                   | <b>Ambient Temp. (°C):</b> | 20.0 - 24.5 |
| <b>Test Heading:</b>                                        | Out of Band Emissions                                                                                                              | <b>Rel. Humidity (%):</b>  | 32 - 45     |
| <b>Standard Section(s):</b>                                 | FCC 22:917(a),<br>FCC 24E: 238(a)<br>FCC 27C, H: 27.53 (c), (g)<br>RSS-130: 4.7.1<br>RSS-132:5.5,<br>RSS-133: 6.5,<br>RSS-139: 6.5 | <b>Pressure (mBars):</b>   | 999 - 1001  |
| <b>Reference Document(s):</b>                               | See Normative References                                                                                                           |                            |             |

### Test Procedure for Out of Band Emissions

With reference to the test configuration identified in Section 6.1 Radiated Test Setup the EUT was set to transmit on the appropriate center frequency of the selected frequency band and bandwidth. Out of Band emissions was tested under QPSK.

Testing was performed under ambient conditions.

### Limits Out of Band Emissions

#### Band 2:

##### FCC 24E: §24.238 Emission limitations for Broadband PCS equipment.

- (a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**RSS-133: 6.5 (i)** In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p(\text{watts})$ . 2 GHz Personal Communications Services RSS-133 4

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p(\text{watts})$ . If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

- (b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

#### Band 4, 12,13:

##### FCC 27C: §27.53 Emission limits for Miscellaneous Wireless Communications Services.

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB;

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log(P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

**(h) AWS emission limits—(1) General protection levels.** Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

**RSS-130: 4.7.1** The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$  (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

**RSS-139: 6.6** Transmitter Unwanted Emissions

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block,<sup>2</sup> which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

**Band 5:**

**FCC 22H: 917(a) Out of band emissions.** The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

**RSS-132: 5.5** Transmitter Unwanted Emissions

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts).

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

#### Band 4: Radiated Transmitter Emissions

**FCC 27.53 h: AWS emission limits—(1) General protection levels.** Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.. ~ -13 dBm or 82.23 dBuV/m

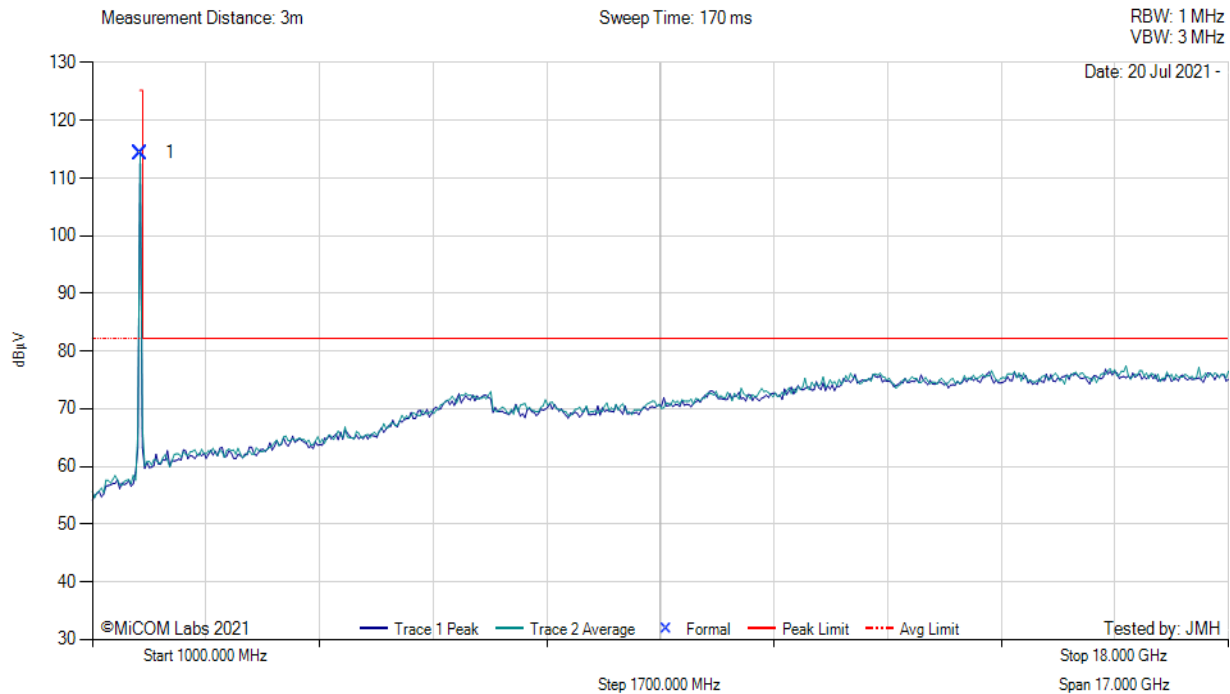
#### Equipment Configuration for Restricted Band Spurious Emissions

|                                 |                |                        |         |
|---------------------------------|----------------|------------------------|---------|
| <b>Antenna:</b>                 | Integral       | <b>Variant:</b>        | LTE     |
| <b>Antenna Gain (dBi):</b>      | Not Applicable | <b>Modulation:</b>     | QPSK    |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable | <b>Duty Cycle (%):</b> | 99      |
| <b>Channel Frequency (MHz):</b> | 1715.0         | <b>Data Rate:</b>      | Full RB |
| <b>Power Setting:</b>           | Max            | <b>Tested By:</b>      | JMH     |

#### Test Measurement Results



Variant: LTE, Test Freq: 1732.50 MHz, Power Setting: Max, Duty Cycle (%): 99



#### 1000.00 - 18000.00 MHz

| Num | Frequency MHz | Raw dBuV | Cable Loss dB | AF dB/m | Level dBuV/m | Measurement Type | Pol      | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|-----|---------------|----------|---------------|---------|--------------|------------------|----------|--------|---------|--------------|-----------|------------|
| 1   | 1715.43       | 83.46    | 1.70          | 29.19   | 114.35       | Max Peak         | Vertical | 153    | 376     | 125.2        | -10.9     | Pass       |

**Test Notes:** COSMO VCU powered by 48 V DC. LTE Call up Band 4 1732.5 MHz, Full RB.

## Band 12: Radiated Transmitter Emissions

### FCC 27.53g: Emission limits for Miscellaneous Wireless equipment.

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB.  $\sim -13$  dBm or 82.23 dBuV/m

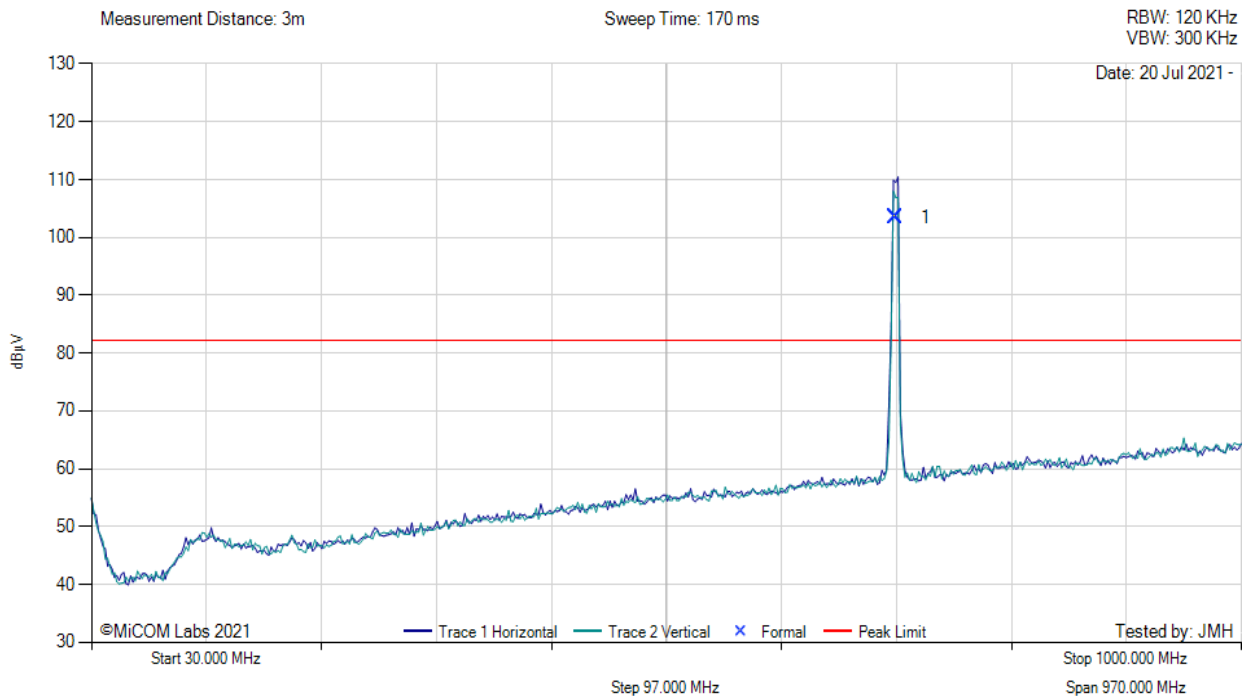
#### Equipment Configuration for Radiated Digital Emissions

|                                 |                |                        |         |
|---------------------------------|----------------|------------------------|---------|
| <b>Antenna:</b>                 | Integral       | <b>Variant:</b>        | LTE     |
| <b>Antenna Gain (dBi):</b>      | Not Applicable | <b>Modulation:</b>     | QPSK    |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable | <b>Duty Cycle (%):</b> | 99      |
| <b>Channel Frequency (MHz):</b> | 704.50         | <b>Data Rate:</b>      | Full RB |
| <b>Power Setting:</b>           | Max            | <b>Tested By:</b>      | JMH     |

#### Test Measurement Results



Variant: LTE, Test Freq: 707.50 MHz, Power Setting: Max



#### 30.00 - 1000.00 MHz

| Num | Frequency MHz | Raw dBuV | Cable Loss dB | AF dB/m | Level dBuV/m | Measurement Type | Pol        | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail |
|-----|---------------|----------|---------------|---------|--------------|------------------|------------|--------|---------|--------------|-----------|------------|
| 1   | 707.81        | 104.37   | 6.22          | -7.16   | 103.43       | Fundamental      | Horizontal | 150    | 0       | --           | --        |            |

**Test Notes:** Cosmo VCU powered by 48V DC. LTE Band 12 704.5 MHz. Full RB

## **APPENDIX A – GRAGHICAL IMAGES**

## A.1. Radiated EIRP

### Band 4: Radiated Output Power

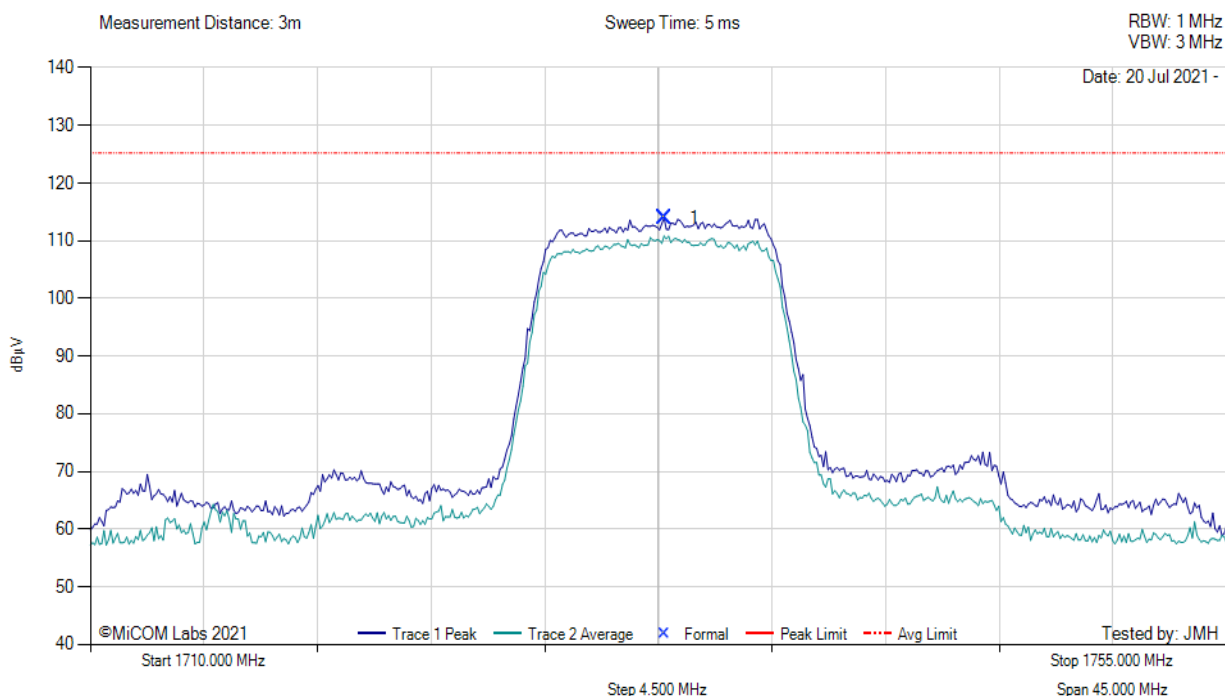
#### Equipment Configuration for Restricted Band Spurious Emissions

|                                 |                |                        |      |
|---------------------------------|----------------|------------------------|------|
| <b>Antenna:</b>                 | Integral       | <b>Variant:</b>        | LTE  |
| <b>Antenna Gain (dBi):</b>      | Not Applicable | <b>Modulation:</b>     | QPSK |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable | <b>Duty Cycle (%):</b> |      |
| <b>Channel Frequency (MHz):</b> | 1732.5         | <b>Data Rate:</b>      |      |
| <b>Power Setting:</b>           | Max            | <b>Tested By:</b>      | JMH  |

#### Test Measurement Results



Variant: LTE, Test Freq: 1732.50 MHz, Power Setting: Max, Duty Cycle (%): 99



#### 1710.00 - 1755.00 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                                                                              | 1732.73       | 82.83    | 1.68          | 29.45   | 113.96       | Max Peak                                                | Vertical | 172    | 148     | 125.2        | -11.2     | Pass       |
| <b>Test Notes:</b> Cosmo VCU powered by 48V DC. LTE Band 4 1732 MHz EIRP Power |               |          |               |         |              | <b>113.96 dBμV/m – 95.23 = 18.73 dbm Limit = 30 dBm</b> |          |        |         |              |           |            |

[Back to Matrix](#)

## Band 12: Radiated Output Power

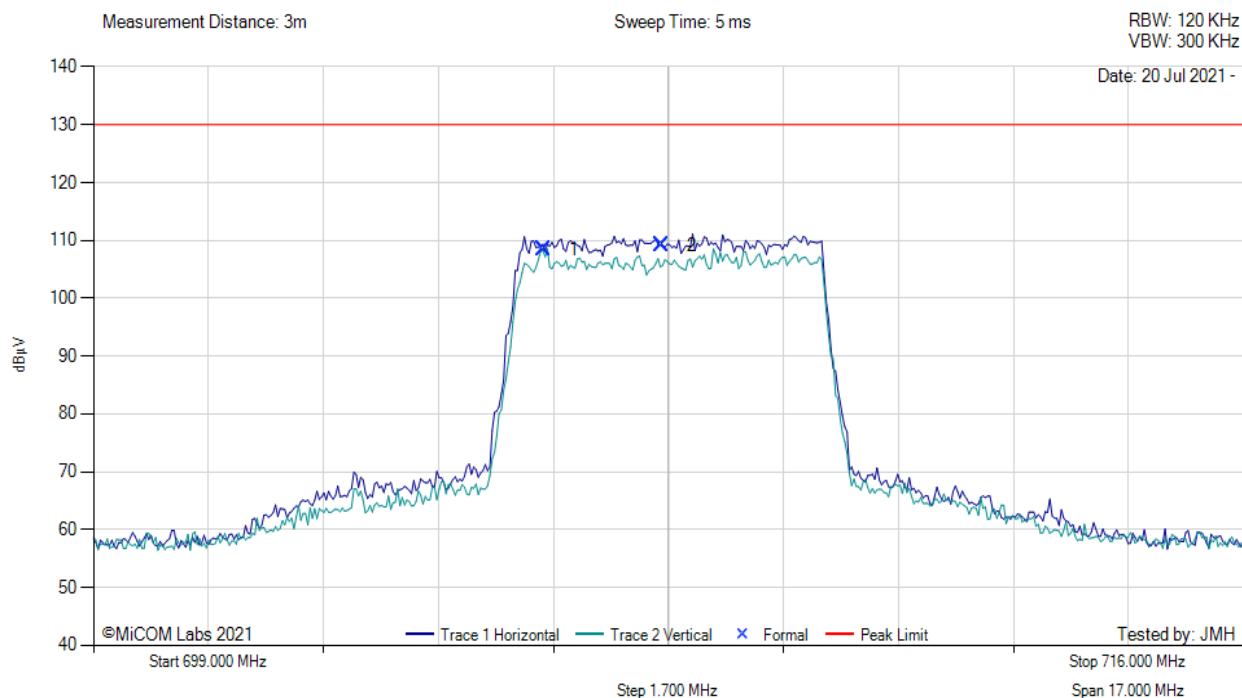
### Equipment Configuration for Restricted Band Spurious Emissions

|                                 |                |                        |      |
|---------------------------------|----------------|------------------------|------|
| <b>Antenna:</b>                 | Integral       | <b>Variant:</b>        | LTE  |
| <b>Antenna Gain (dBi):</b>      | Not Applicable | <b>Modulation:</b>     | QPSK |
| <b>Beam Forming Gain (Y):</b>   | Not Applicable | <b>Duty Cycle (%):</b> |      |
| <b>Channel Frequency (MHz):</b> | 707.5          | <b>Data Rate:</b>      |      |
| <b>Power Setting:</b>           | Max            | <b>Tested By:</b>      | JMH  |

### Test Measurement Results



Variant: LTE, Test Freq: 707.50 MHz, Power Setting: Max



### 699.00 - 716.00 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                                                                      | 705.65        | 109.49   | 6.22          | -7.25   | 108.46       | MaxQP            | Horizontal                                                 | 148    | 141     | 130.0        | -21.5     | Pass       |
| 2                                                                      | 707.40        | 110.07   | 6.22          | -7.16   | 109.13       | MaxQP            | Horizontal                                                 | 148    | 138     | 130.0        | -20.9     | Pass       |
| <b>Test Notes:</b> Cosmo VCU powered by 48V DC . LTE Band 12 707.5 MHz |               |          |               |         |              |                  | <b>109.13 dBμV/m – 95.23 = 13.90 dbm Limit = 34.77 dBm</b> |        |         |              |           |            |



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