FCC Test Report

FOR:
Jio, Inc.

Model Number:
11062015

Product Description:
Jiobit Smart Tag Location Tracker

FCC ID: 2AKLI-080716

Per:
47 CFR: Part 27

REPORT #: EMC_JIOBI-002-20001_FCC_27

DATE: 2021-01-15

A2LA Accredited

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

TABLE OF CONTENTS

1 Assessment

The following device as further described in section 3 of this report was evaluated for radiated spurious emissions in simultaneous transmission of cellular and unlicensed radios according to criteria specified in the Code of Federal Regulations Title 47 parts 27

Company	Description	Model #
Jio, Inc.	Jiobit Smart Tag Location Tracker	11062015

No deficiencies were ascertained.

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2021-01-15	Compliance	Cindy Li (Lab Manager)	

Responsible for the Report:

Date	Section	Name	Signature
2021-01-15	Compliance	Yuchan Lu (Test Engineer)	Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2021.01.15 12:01:16 -08'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Lab Manager:	Cindy Li
Responsible Project Leader:	Cathy Palacios

2.2 Identification of the Client

Client's Name:	Jio, Inc.
Street Address:	30 N LaSalle Suite 2630
City/Zip Code	Chicago, IL 60602
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Hardware Version Identification Number (HVIN):	11062015
Product Marketing Name (PMN):	Jiobit
Antenna Information as declared:	Planar inverted-F antenna Antenna gains: • LTE Band 13: -5.5 dBi
Other Radios included in the device:	❖ BLE, WLAN • Manufacture: muRata • Module name/number: LBEE5KL1DX • FCC ID:VPYLB1DX
Power Supply/ Rated Operating Voltage Range:	Vmin: 2.9 VDC/ Vnom: 3.8 VDC / Vmax: 4.35 VDC
Operating Temperature Range:	Low -10ºC, Nominal 25ºC, High 50ºC
Sample Revision	☐ Prototype Unit; ■ Production Unit; ☐ Pre-Production
EUT Dimensions(mm):	37.03 x 49.98 x 12.11
Weight(grams):	18
EUT Diameter	■ < 60 cm ☐ Other _____

Module Information	
Module Name:	Sierra Wireless
Model Number:	HL7800
FCC ID:	N7N-HL78M

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	R-00039	Revision A	Release 8.75	Radiated Emissions

3.3 Accessory Equipment details

AE #	Type	Manufacture	Model	P/N
1	Charging USB cable and charging cradle	-	-	-

3.4 Support Equipment

SE #	Description
1	AC/DC Converter, Manufacture: Harman, Model: EFA01200500200CE
2	Android Phone Manufacture: Motorola, Model: Moto G play, Android version: 7.1.1

3.5 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT# 1 + AE# 1 + SE#1	Worst Case

3.6 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	Cellular Transmission	Cellular was tested on CAT M1 Band 13 Low, Mid, High Channels at the maximum power, and co-transmitting with BLE mid channel. For radiated measurements, the internal antenna was connected.

3.7 Justification for Worst Case Mode of Operation

During the testing process the EUT was tested with transmitter sets on CAT M1 low, mid and high channels and co-transmitting with BLE mid channel at the maximum power transmission.

For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the evaluation conducted by CETECOM Inc. is to support a request for new equipment authorization under **FCC ID:** 2AKLI-080716.

The pre-certified module to be integrated (HL7800) as described in Section 3, Radiated Spurious Emissions test was performed. Results have been checked to meet limits per Code of Federal Regulations Title 47 parts 27.

The conducted module test data that can be obtained under the **FCC Filing ID:** N7N-HL78M is applicable for the host described in section 3.

4.1 Dates of Testing:

01/04/2020 – 01/06/2020

4.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

4.3 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

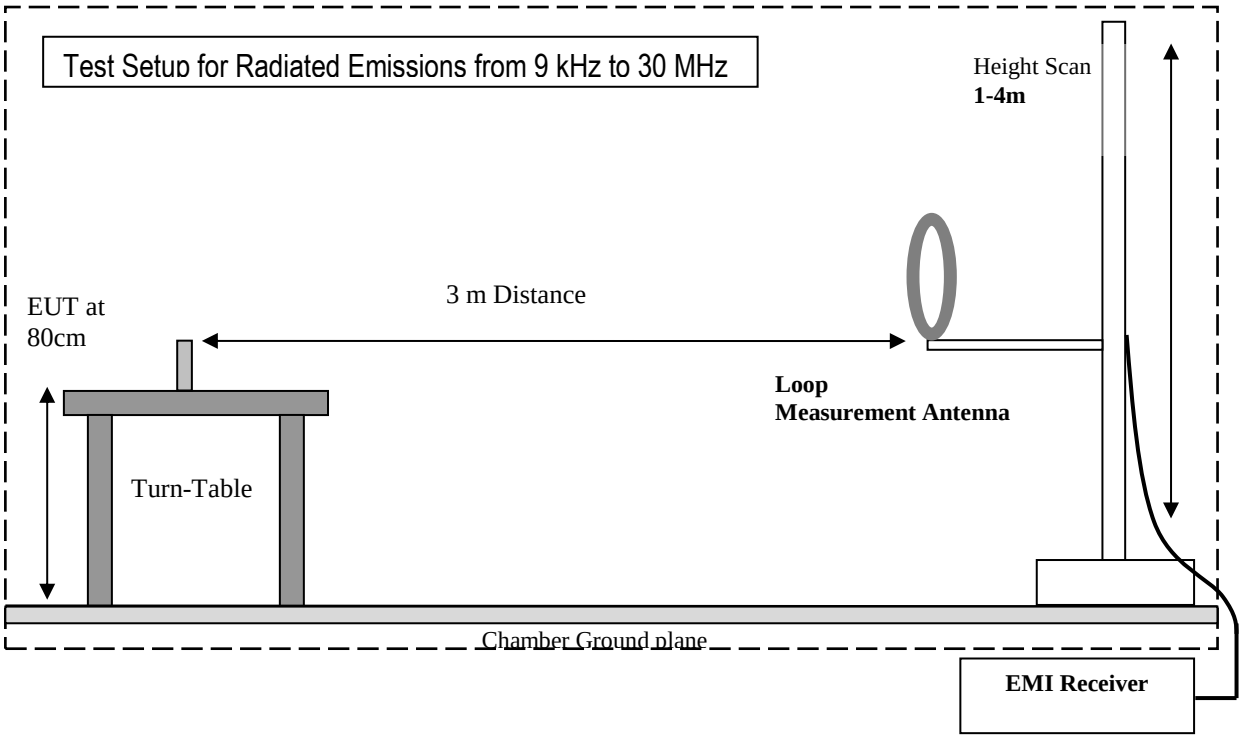
Deviating test conditions are indicated at individual test description where applicable.

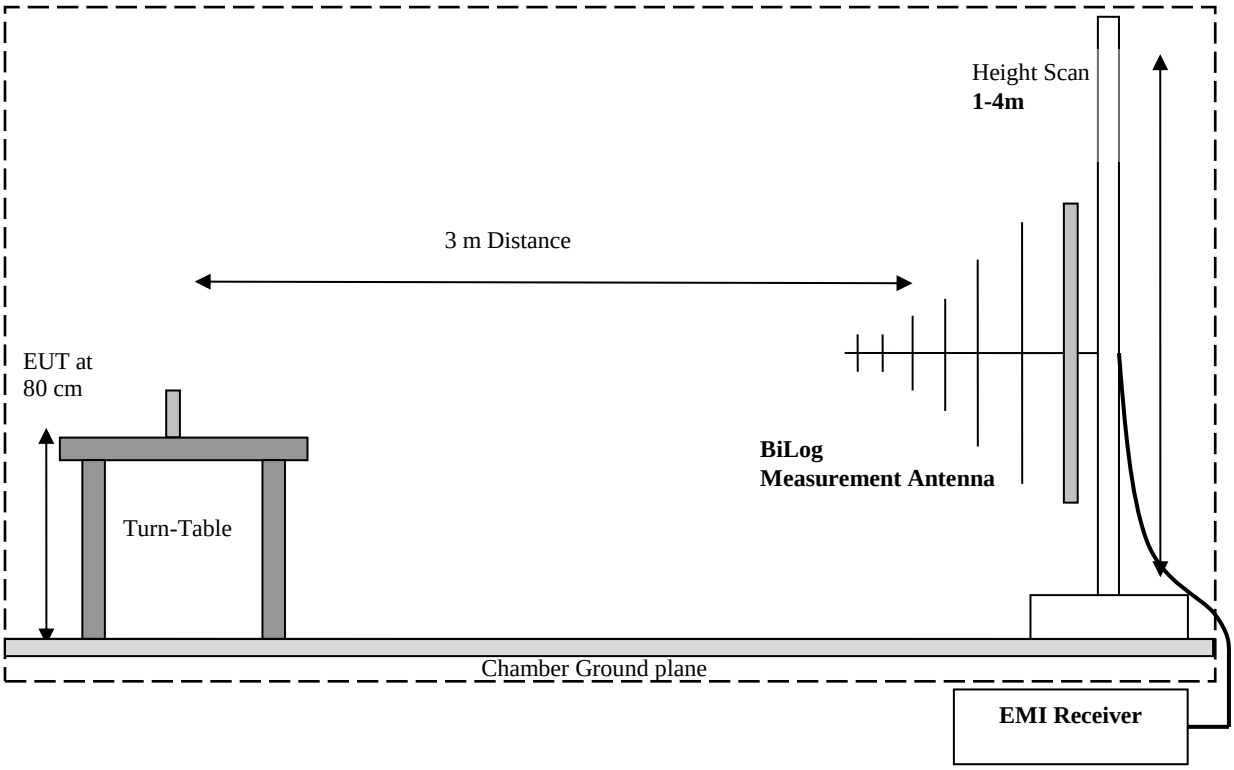
5 Measurement Procedures

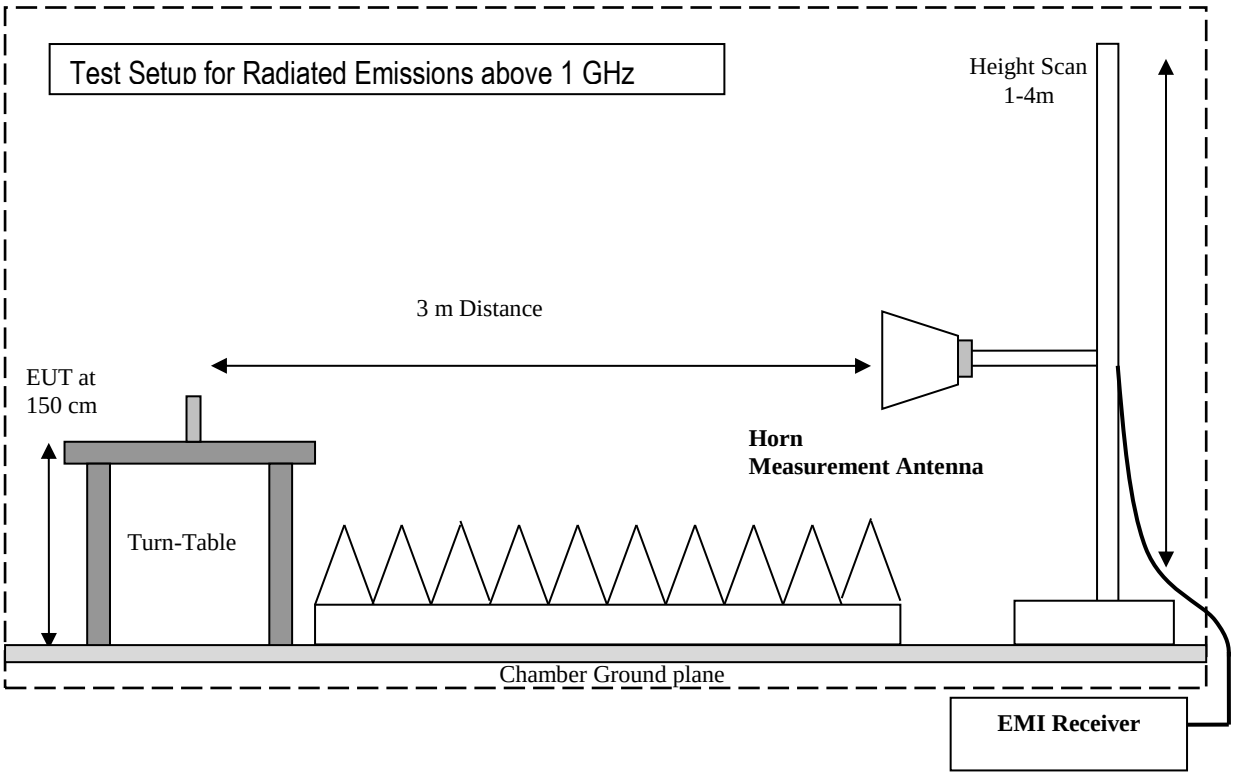
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v03 – "Measurement Guidance for Certification of Licensed Digital Transmitters" and according to ANSI C63.26 as detailed below.

5.1 Radiated Measurement

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.




Height Scan
1-4m
3 m Distance
EUT at
80 cm
BiLog
Measurement Antenna
Turn-Table
Chamber Ground plane
EMI Receiver


Test Setup for Radiated Emissions above 1 GHz
Height Scan
1-4m
3 m Distance
EUT at
150 cm
Horn
Measurement Antenna
Turn-Table
Chamber Ground plane
EMI Receiver

5.2 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

- Measured reading in dBµV
- Cable Loss between the receiving antenna and SA in dB and
- Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

6 Measurement Results Summary

6.1 FCC 27

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §27.50 (d)	RF Output Power	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1055; §27.54	Frequency Stability	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1049; §27.53	Occupied Bandwidth	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §27.53	Band Edge Compliance	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1051; §27.53	Conducted Spurious Emissions	Nominal	-	☐	☐	☐	■	Note 1 Note 2
§2.1053; §27.53(g); §27.53(h);	Radiated Spurious Emissions	Nominal	Op.1	■	☐	☐	☐	Complies

Note 1: NA= Not Applicable; NP= Not Performed.
Note 2: The conducted measurements are leveraged from module certification FCC ID: N7N-HL78M or compliance against the applicable rules.

7 Test Result Data

7.1 E(I)RP

Band	Frequency Range (MHz)	Power conducted (W)	Emission Designator	Antenna Gain + Cable loss (dBi)	gain linear	EIRP[1] (W)	ERP[1] (W)	Frequency deviation (ppm)	Limit ERP (W)
LTE 13	779.5 - 784.5	0.233	1M09G7D	-5.5	0.282	0.066	0.040	0.005	3
LTE 13	782 - 782	0.208	912KW7D	-5.5	0.282	0.059	0.036	0.005	3

Note 1: E(I)RP are calculated from maximum power in grant of cellular module HL7800 adding the maximum gain of the utilized cellular antenna per operational description.

7.2 Radiated Spurious Emissions

7.2.1 Measurement according to FCC: CFR 47 Part 2.1053; CFR Part 27.53 utilizing KDB 971168 D01 Power Meas License Digital Systems v03, and according to ANSI C63.26 2017

Spectrum Analyzer Settings for FCC 27

Frequency Range	30MHz – 1 GHz	1 – 2.7 GHz	2.7 – 18 GHz	18 – 19.1 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto	Auto

7.2.2 Limits:

- **FCC Part 27.53 (g) and Part 27.53 (h)**

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 = (-13dBm)

7.2.3 Test conditions and setup:

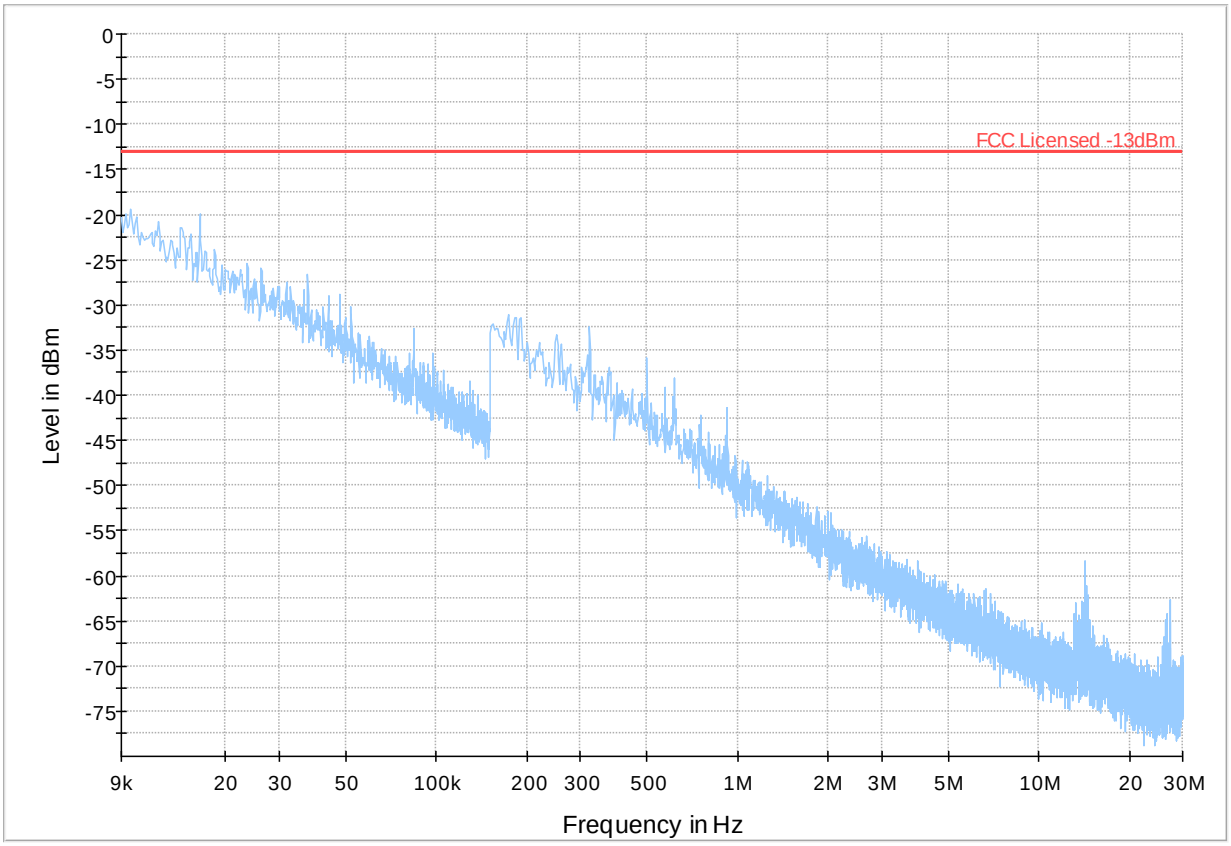
Ambient Temperature (C)	EUT operating mode	Power Input
22	Op. 1	110 VAC

7.2.4 Measurement Plots:

LTE Band 13

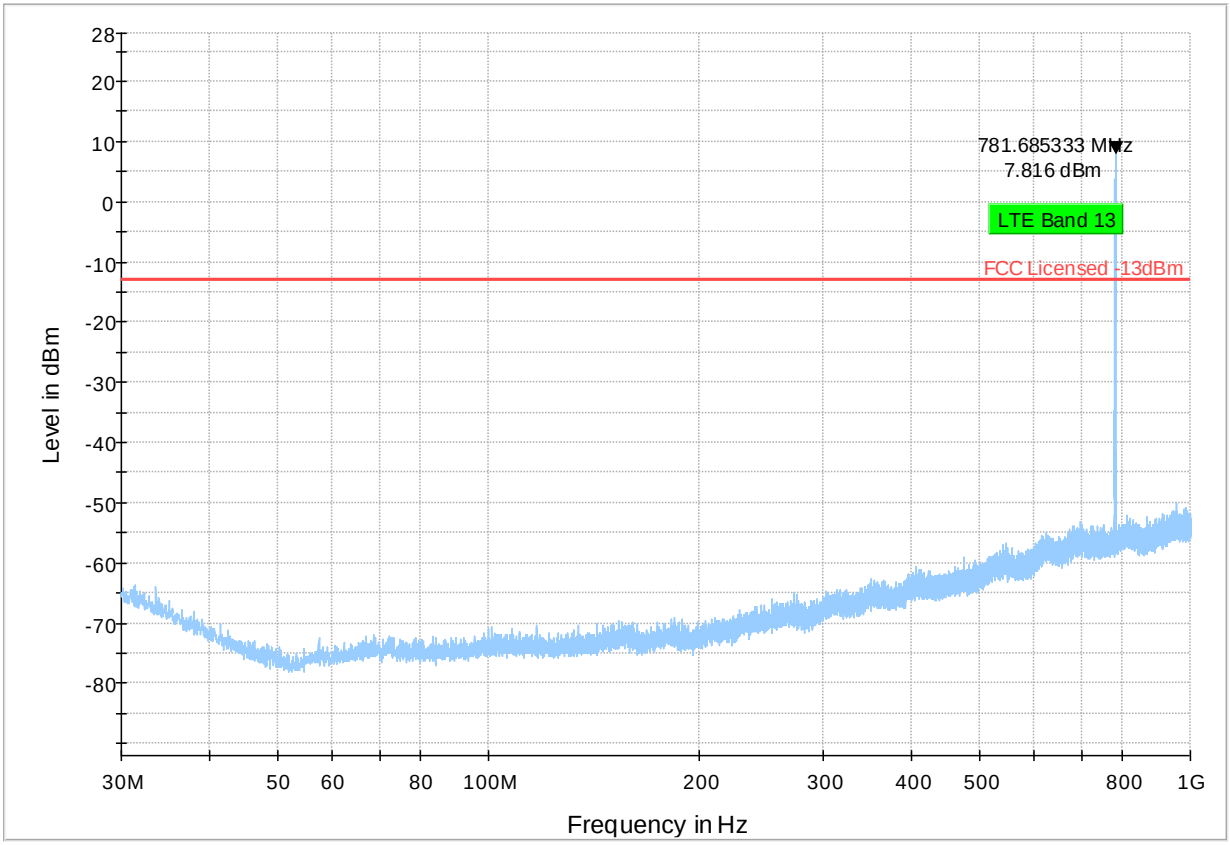
Plot # 1 Radiated Emissions: 9 kHz - 30 MHz

Channel: Mid



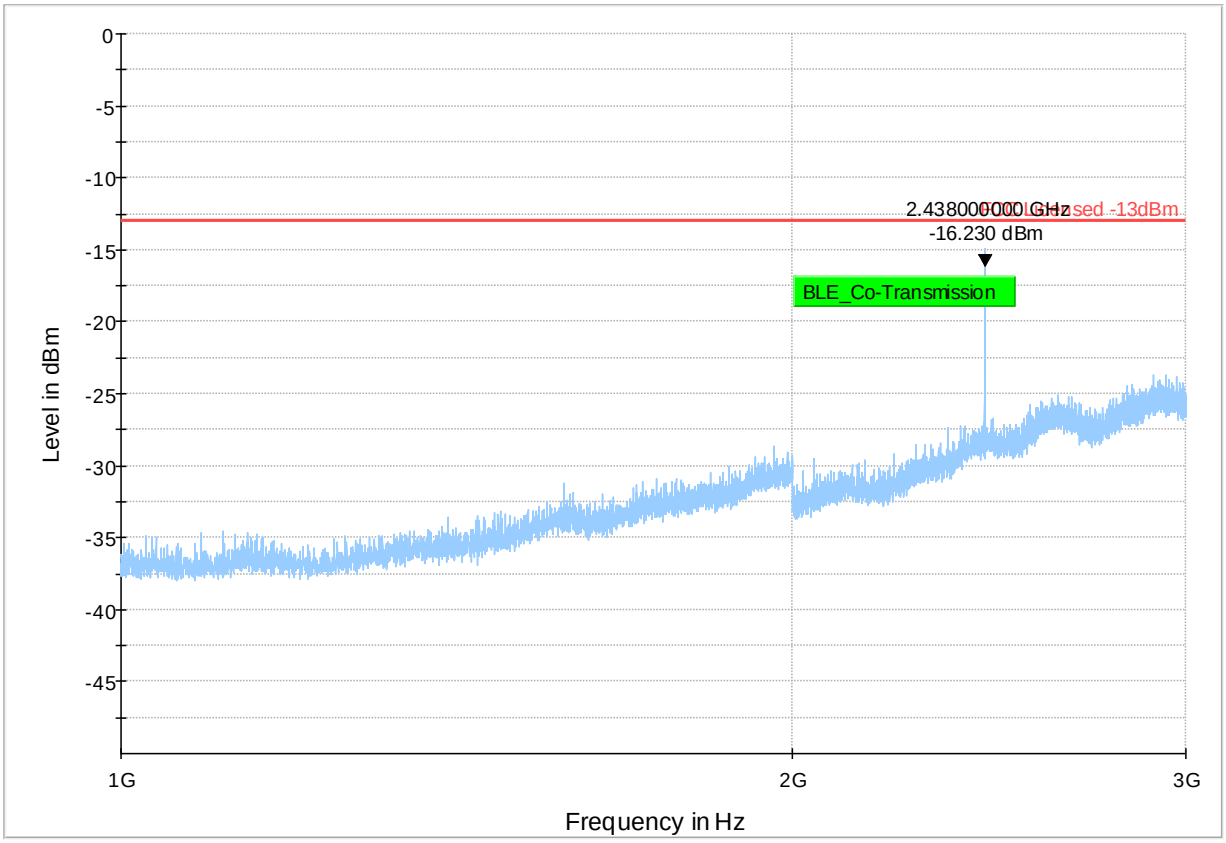
Plot # 2 Radiated Emissions: 30 MHz – 1GHz

Channel: Mid



Plot # 3 Radiated Emissions: 1 GHz - 3 GHz

Channel: Mid

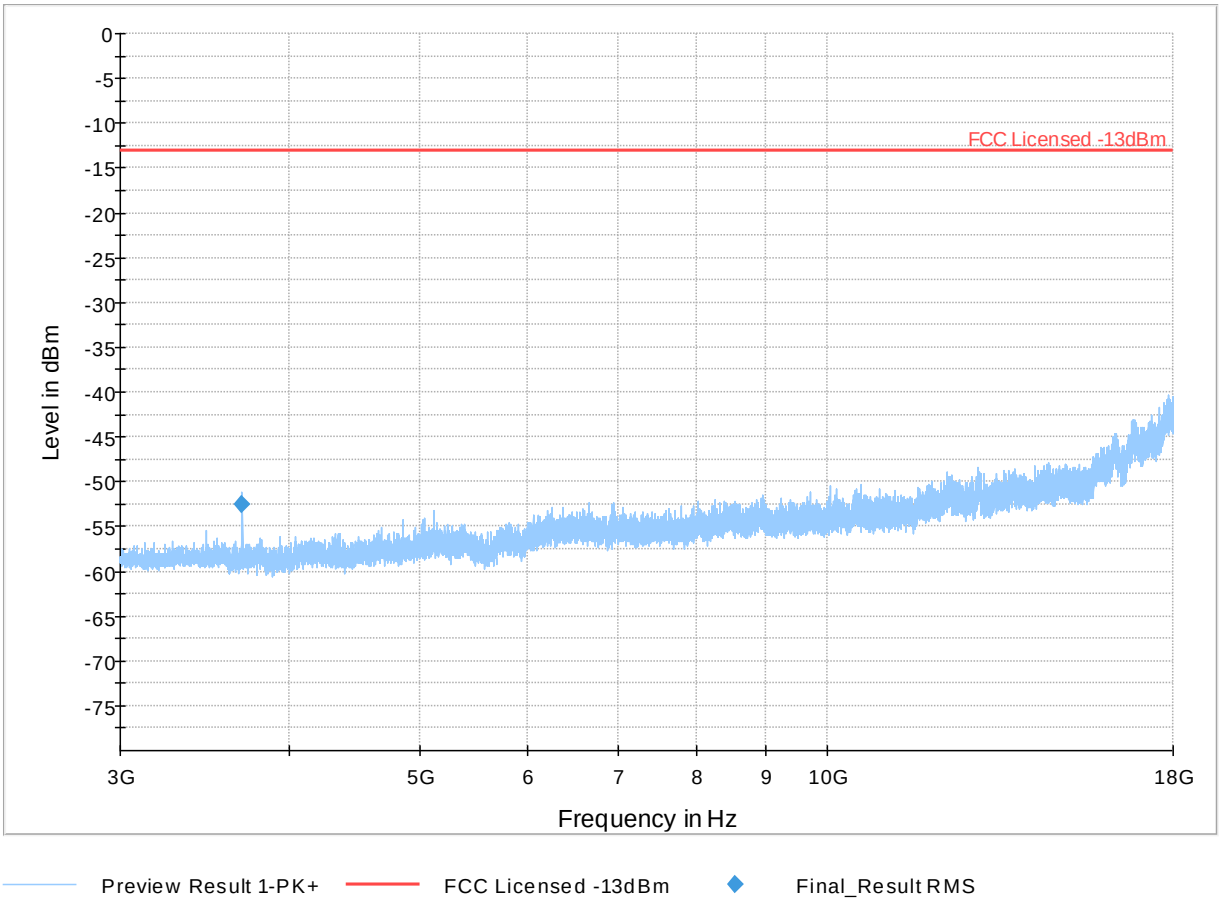


Plot # 4 Radiated Emissions: 3 GHz – 18 GHz

Channel: Mid

Final_Result

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Comment
3693.000	-52.46	-13.00	39.46	500.0	1000.000	163.0	V	248.0	-101.7	



8 Test setup photo

Setup photos are included in supporting file name: “EMC_JIOBI-002-20001_Setup_Photos.pdf”

9 Test Equipment and Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
ACTIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 YEARS	10/30/2020
BILOG ANTENNA	A.H.Systems	3049	569	3 YEARS	09/24/2020
HORN ANTENNA	ETS.LINDGREN	3115	00035111	3 YEARS	04/17/2019
HORN ANTENNA	ETS LINDGREN	3117	00169547	3 YEARS	09/01/2020
HORN ANTENNA	ETS LINDGREN	3116	00070497	3 YEARS	11/23/2020
WIDEBAND RADIO COMMUNICATION	R&S	CMW500	109825	3 YEARS	02/12/2018
SIGNAL ANALYZER	R&S	FSV 40	101022	3 YEARS	07/15/2019
COMPACT DIGITAL BAROMETER	CONTROL COMPANY	10510-922	200236891	3 YEARS	04/13/2020
DIGITAL THRMOMETER	CONTROL COMPANY	36934-164	191871994	3 YEARS	01/10/2019
LINE IMPEDANCE STABILIZATION NETWORK	FCC	FCC-LISN-50-25-2-08	08014	3 YEARS	07/19/2019

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.
Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated “N/A” for cal status either do not specifically require calibration or is internally characterized before use.

10 Revision History

Date	Report Name	Changes to report	Report prepared by
2021-01-15	EMC_ JIOBI-002-20001_FCC_27	Initial version	Yuchan Lu

<<The End>>