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FCC ISED RF Test Report

Test Report Number	GLS-21120843-LC-FCC-IC-RF
FCC ID	2AH4HATD530
ISED ID	21385-ATD530
Applicant	Mobilogix
Applicant Address	5500 Trabuco Road, Suite 150, Irvine, CA 92620
Product Name	BAT-SUR
Model (s)	ATD530D
Date of Receipt	12/09/2021
Date of Test	12/13/2021-12/21/2021
Report Issue Date	12/22/2021
Test Standards	47CFR Part 22 47CFR Part 24 47CFR Part 27 47CFR Part 90 RSS-130 Issue 2: Feb 2019 RSS-132 Issue 3: Jan 2013 RSS-133 Issue 6: Jan 2018 RSS-139 Issue 3: Jul 2015
Test Result	**PASS**

Issued by:

Vista Compliance Laboratories
1261 Puerta Del Sol, San Clemente, CA 92673 USA
www.vista-compliance.com

Devin Tai (Test Engineer)

David Zhang (Technical Manager)

REVISION HISTORY

Report Number	Version	Description	Issued Date
GLS-21120843-LC-FCC-IC-RF	01	Initial report	12/22/2021

TABLE OF CONTENTS

1 Test Summary

Test Item	Test Requirement	Test Method	Result
Field Strength of Spurious Radiation (licensed band)	2.1046 22.917 (a), 24.238 (a), 90.691, 27.53 (f), (g), (h), (c)(2) and (5) RSS-130(4.7.1) and (4.7.2) RSS-132 (5.5) RSS-133 (6.5) RSS-139 (6.6) SRSP-510(5.1.2)	ANSI C63.26: 2015 KDB 971168 D01 Power Meas License Digital Systems v03r01 KDB 412172 D01 Determining ERP and EIRP v01r01	Pass

2 General Information

2.1 Applicant

Applicant	Mobilogix, Inc.
Applicant address	5500 Trabuco Road, Suite 150, Irvine, CA 92620
Manufacturer	Mobilogix, Inc.
Manufacturer Address	5500 Trabuco Road, Suite 150, Irvine, CA 92620

2.2 Product information

Product Name	BAT-SUR
Product Description	Single-use Recyclable Global Tracker with NIST Traceable Sensors
Model Number	ATD530D
Family Models	N/A
Serial Number	866456054323306
Frequency Band	GSM/GPRS/EDGE 850: 824 MHz ~ 849MHz GSM/GPRS/EDGE 1900: 1850 MHz ~ 1910MHz LTE Band 2: 1850~1910MHz LTE Band 4: 1710~1755MHz LTE Band 12: 699~716MHz LTE Band 13: 777~787MHz LTE Band 25: 1850~1915MHz LTE Band 26: 814~849MHz NB-IOT Band 2: 1850~1910MHz NB-IOT Band 4: 1710~1755MHz NB-IOT Band 5: 824~849MHz NB-IOT Band 12: 699~716MHz NB-IOT Band 13: 777~787MHz NB-IOT Band 71: 663~698MHz
Type of modulation	GSM/GPRS/EDGE: GMSK, 8PSK LTE CAT-M1: QPSK, 16QAM LTE NB-IOT: BPSK, QPSK
Equipment Class	PCB
Antenna Information	Internal LPWA Antenna (P/N: AVX/Ethertronics 1004795) GSM 850: -3.2dBi, PCS 1900:0.83dBi LTE B2/B4/B25: 0.83dBi LTE B5/B12/B13/B26/B71: -3.2dBi
Clock Frequencies	N/A
Input Power	3 VDC (battery powered, 2 x AA batteries)
Power Adapter Manufacturer/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Simultaneous Transmission	N/A
Additional Info	EUT contains cellular module that has received FCC and ISED single modular approval. (FCC ID: 2AJYU-8VC0001 / ISED ID: 23761-8VC0001). There isn't any other transmitter that co-locates with this module.

2.3 Test standard and method

Test standard	47CFR Part 22 47CFR Part 24 47CFR Part 27 47CFR Part 90 RSS-130 Issue 2: Feb 2019 RSS-132 Issue 3: Jan 2013 RSS-133 Issue 6: Jan 2018 RSS-139 Issue 3: Jul 2015 SRSP-510 Issue 5: Feb 2009 RSS-Gen Issue 5: Mar 2019
Test method	ANSI C63.26: 2015 KDB 971168 D01 Power Meas License Digital Systems v03r01 KDB 412172 D01 Determining ERP and EIRP v01r01

3 Test Site Information

Lab performing tests	Vista Laboratories, Inc.
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.vista-compliance.com

Test Condition	Temperature	Humidity	Atmospheric Pressure
RF Testing	22.5°C	42.8%	1006 mbar
Radiated Emission Testing	22.5°C	42.8%	1006 mbar

4 Modification of EUT / Deviations from Standards

N/A

5 Test Configuration and Operation

5.1 EUT Test Configuration

EUT is powered by internal battery. The cellular radio of EUT is connected to and controlled by CMW500, the base station emulator, communicate continuously in different modulation, test channel and data rate. The SIM7070G module contained in this product has received FCC and ISED single modular approval. (FCC ID: 2AJYU-8VC0001 / ISED ID: 23761-8VC0001). Current test report contains verification result under the worst-case test mode to demonstrate the continuous compliance of this product to FCC/ISED technical requirement after the integration of this certified cellular module.

The following software was used for testing and to monitor EUT performance

Software	Description
EMISoft Vasona	EMC/RF Spurious emission test software used during testing

5.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #
-	-	-	-

6 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
Radiated Emission (9KHz-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

7 Test Results

7.1 Strength of Spurious Radiation

7.1.1 Requirement

§ 2.1051,22.917(a), 24.238(a), 27.53 (f), (g), (h) and (c)(2) and (5)

RSS-130(4.7.1) and (4.7.2), RSS-132(5.5), RSS-133(6.5), RSS-139(6.6)

FCC 47 CFR Part 22, Clause 22.917 (a) and FCC 47 CFR Part 24, Clause 24.238 (a)

(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.

FCC 47 CFR Part 27, Clause 27.53 (c)(2) and (5)

(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;

(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

FCC 47 CFR Part 27, Clause 27.53 (f)

(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

FCC 47 CFR Part 27, Clause 27.53 (g)

(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.

FCC 47 CFR Part 27, Clause 27.53 (h)

(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 log10 (P) dB.

(3) Measurement procedure. (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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.

FCC 47 CFR Part 90, Clause 90.691

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

RSS-130, Clause 4.7.1 and 4.7.2

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 log10 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.

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746- 756 MHz and 777-787 MHz shall also comply with the following restrictions:

a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:

(i) 76 + 10 log10 p (watts), dB, for base and fixed equipment, and

(ii) 65 + 10 log10 p (watts), dB, for mobile and portable equipment.

b) The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and 80 dBW for discrete emission with bandwidth less than 700 Hz.

RSS-132, Clause 5.5

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 log10 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 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS-133, Clause 6.5.1

Equipment shall comply with the limits in (i) and (ii) below.

(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 log10 p(watts).

(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 log10 p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

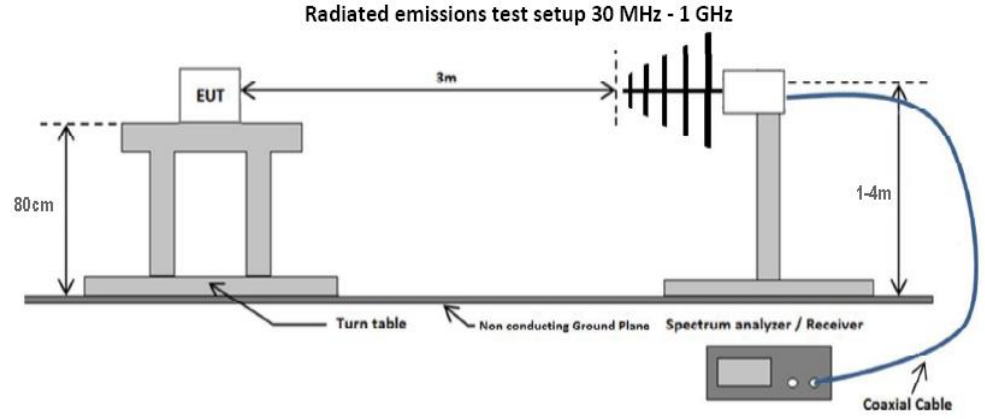
RSS-139, Clause 6.6

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, 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 log10 p (watts) dB.

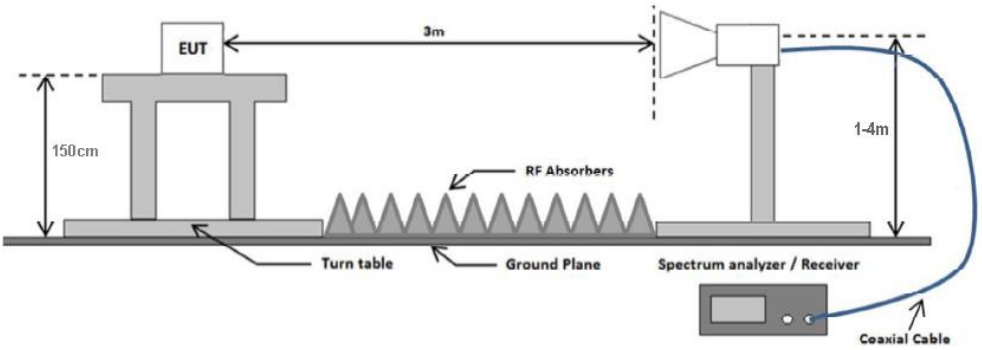
(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

7.1.2 Test setup

Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



7.1.3 Test Procedure

ANSI C63.26: 2015 section 5.5

KDB 971168 D01 Power Meas License Digital Systems v03r01 section 7

Boresight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

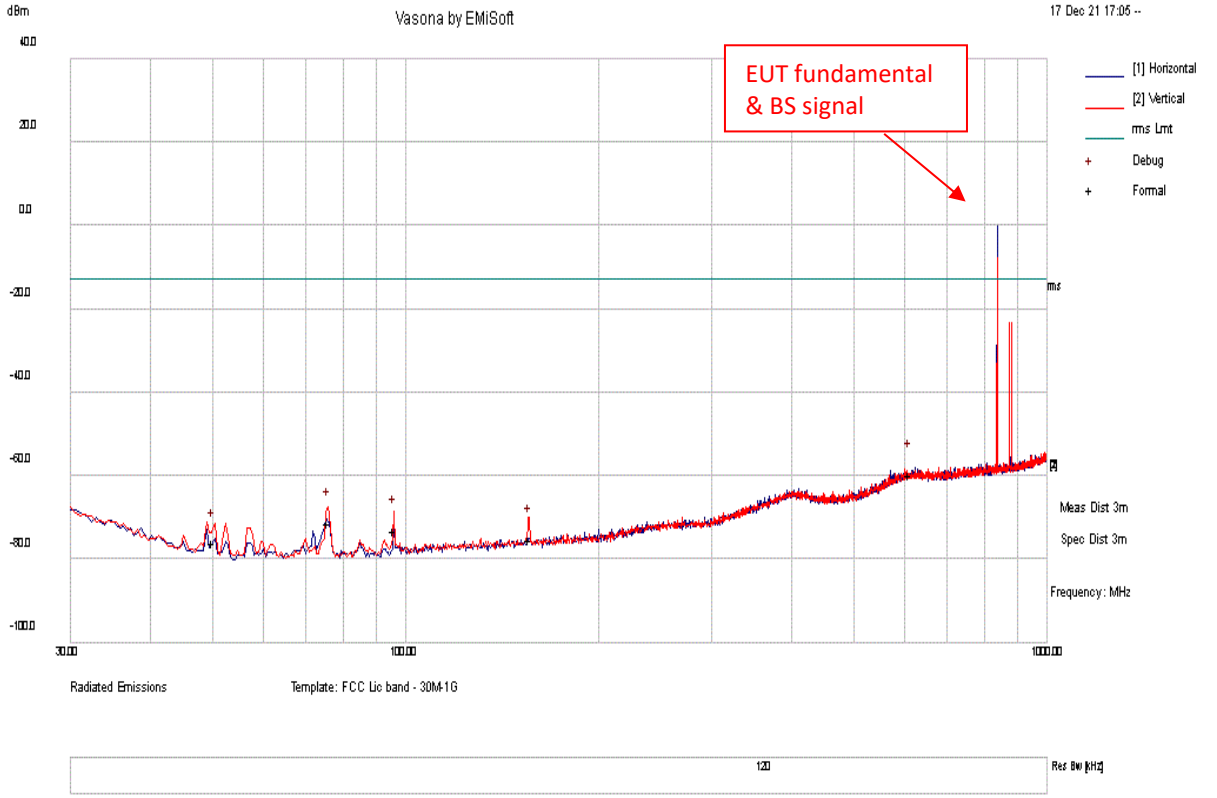
1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
   a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.

5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

7.1.4 Test Result

RADIATED EMISSIONS BELOW 1 GHZ

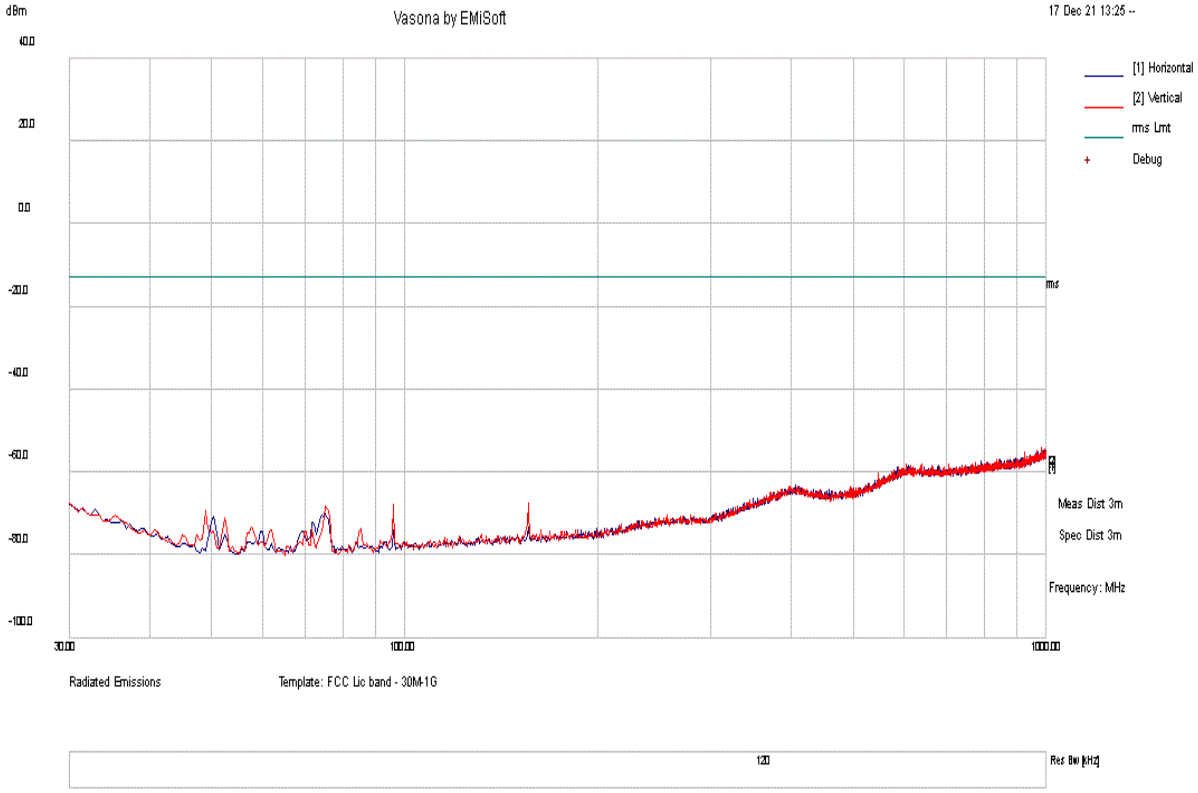
Test Standard:	Part 22 & RSS 132	Mode:	GSM B5 Mid Channel
Frequency Range:	30 MHz - 1 GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
75.71	-66.10	15.00	-20.20	-71.20	RMS Max	V	141	17	-13.00	-58.20	Pass
50.06	-69.90	14.60	-20.80	-76.10	RMS Max	V	143	35	-13.00	-63.10	Pass
155.84	-73.50	16.10	-17.70	-75.10	RMS Max	V	239	70	-13.00	-62.10	Pass
95.93	-68.90	15.30	-19.50	-73.10	RMS Max	V	186	72	-13.00	-60.10	Pass

RADIATED EMISSIONS BELOW 1 GHZ

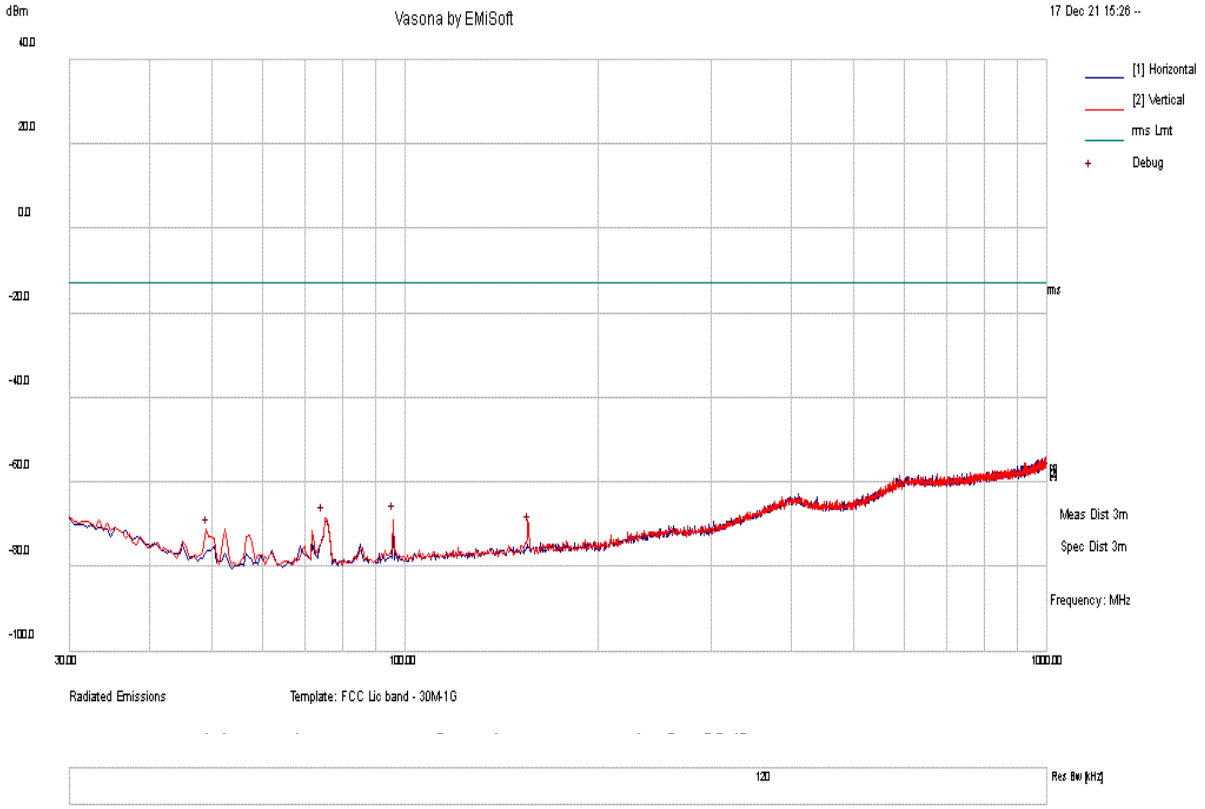
Test Standard:	Part 24E & RSS 133	Mode:	GSM B2 Mid Channel
Frequency Range:	30 MHz - 1 GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
75.440	-63.4	15.00	-20.20	-68.6	RMS Max	V	181	120	-13	-55.6	Pass
95.902	-64.4	15.30	-19.50	-68.6	RMS Max	V	227	289	-13	-55.3	Pass
155.693	-66.2	16.10	-17.70	-67.8	RMS Max	H	182	113	-13	-54.8	Pass

RADIATED EMISSIONS BELOW 1 GHZ

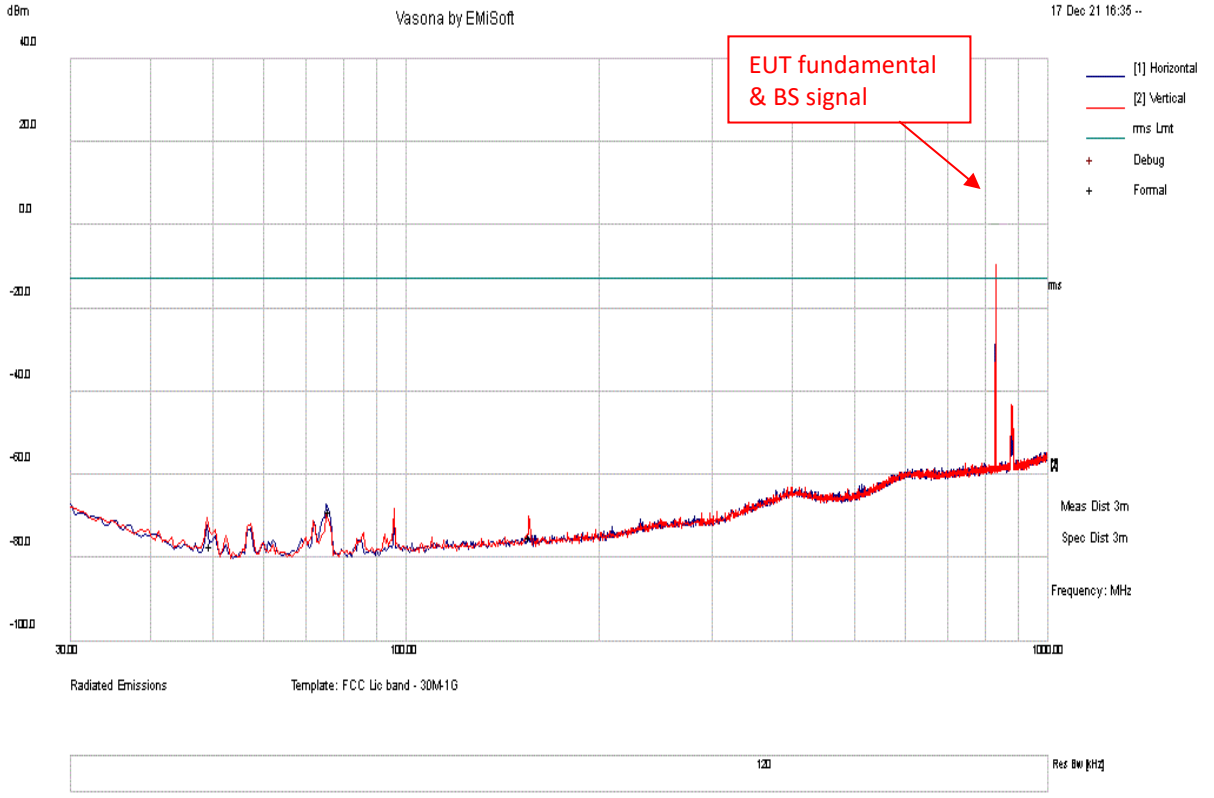
Test Standard:	Part 27 & RSS 139	Mode:	LTE CAT-M1 B4 Mid Channel
Frequency Range:	30 MHz - 1 GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
49.19	-70.40	14.50	-20.60	-76.40	RMS Max	V	169	195	-13.00	-63.40	Pass
74.40	-68.10	15.00	-20.20	-73.30	RMS Max	V	126	250	-13.00	-60.30	Pass
96.00	-68.80	15.30	-19.50	-73.10	RMS Max	V	264	336	-13.00	-60.10	Pass
155.85	-73.90	16.10	-17.70	-75.50	RMS Max	V	127	334	-13.00	-62.50	Pass

RADIATED EMISSIONS BELOW 1 GHZ

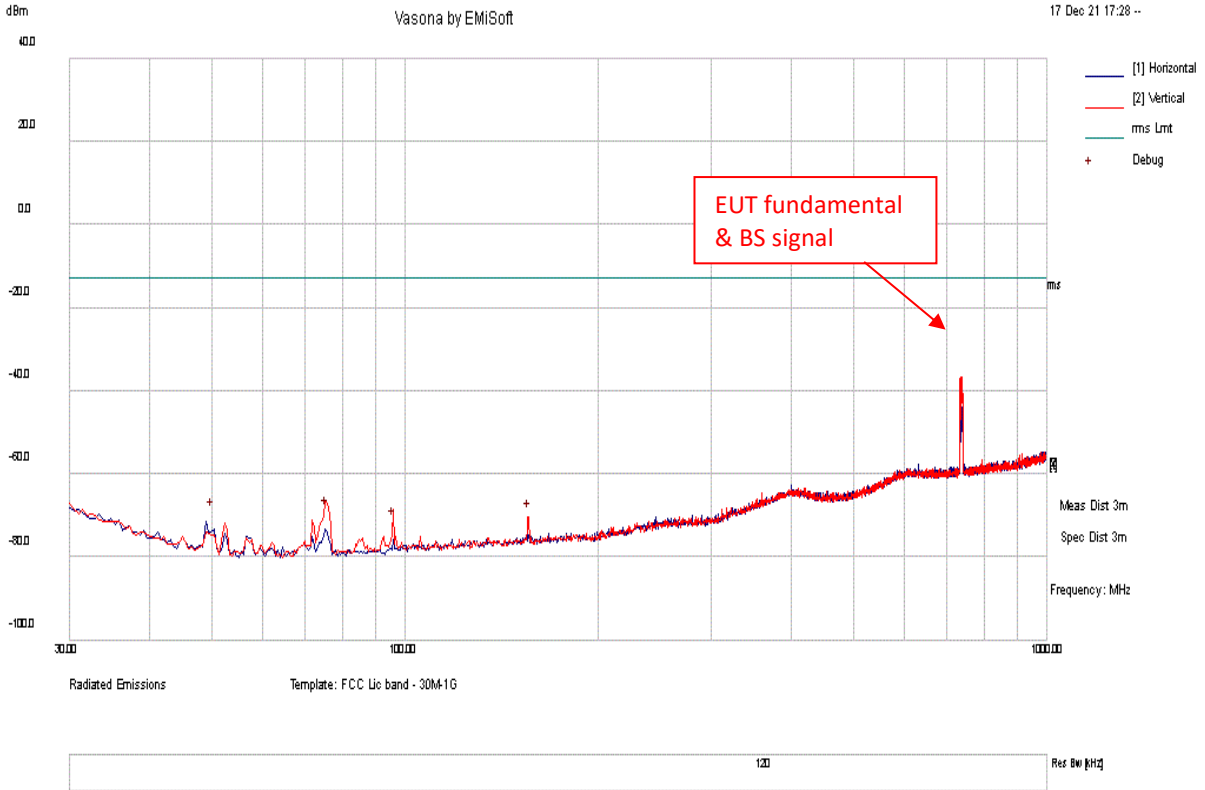
Test Standard:	Part 22 & RSS 132	Mode:	LTE NB-IoT B5 Mid Channel
Frequency Range:	30 MHz - 1 GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
75.98	-63.60	15.00	-20.20	-68.80	RMS Max	V	165	286	-13.00	-55.80	Pass
49.62	-71.00	14.60	-20.70	-77.20	RMS Max	V	193	174	-13.00	-64.20	Pass
155.78	-73.40	16.10	-17.70	-75.00	RMS Max	V	268	63	-13.00	-62.00	Pass

RADIATED EMISSIONS BELOW 1 GHZ

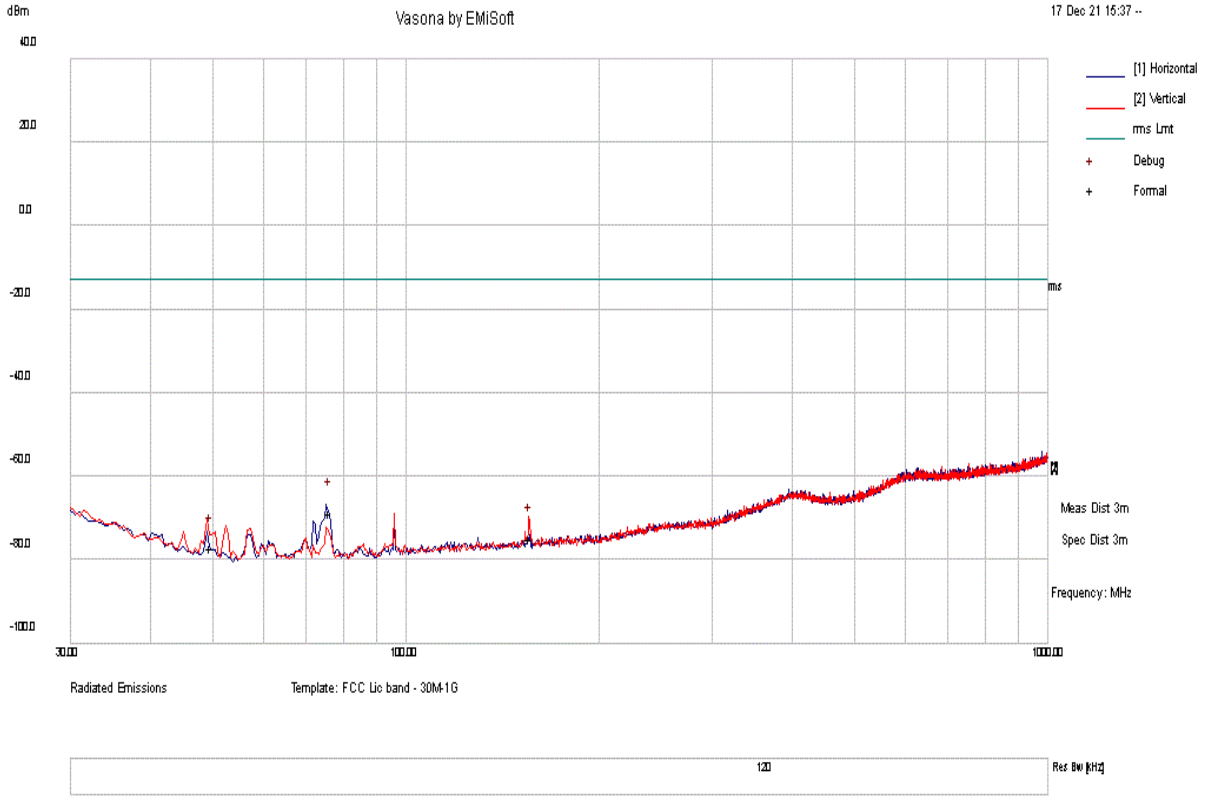
Test Standard:	Part 27 & RSS 130	Mode:	LTE NB-IoT B12 Mid Channel
Frequency Range:	30 MHz - 1 GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
50.06	-67.70	14.60	-20.80	-73.90	RMS Max	V	165	246	-13.00	-60.90	Pass
75.45	-68.60	15.00	-20.20	-73.80	RMS Max	V	171	276	-13.00	-60.80	Pass
96.00	-71.90	15.30	-19.50	-76.10	RMS Max	V	103	128	-13.00	-63.10	Pass
156.01	-73.00	16.10	-17.70	-74.60	RMS Max	V	249	26	-13.00	-61.60	Pass

RADIATED EMISSIONS BELOW 1 GHZ

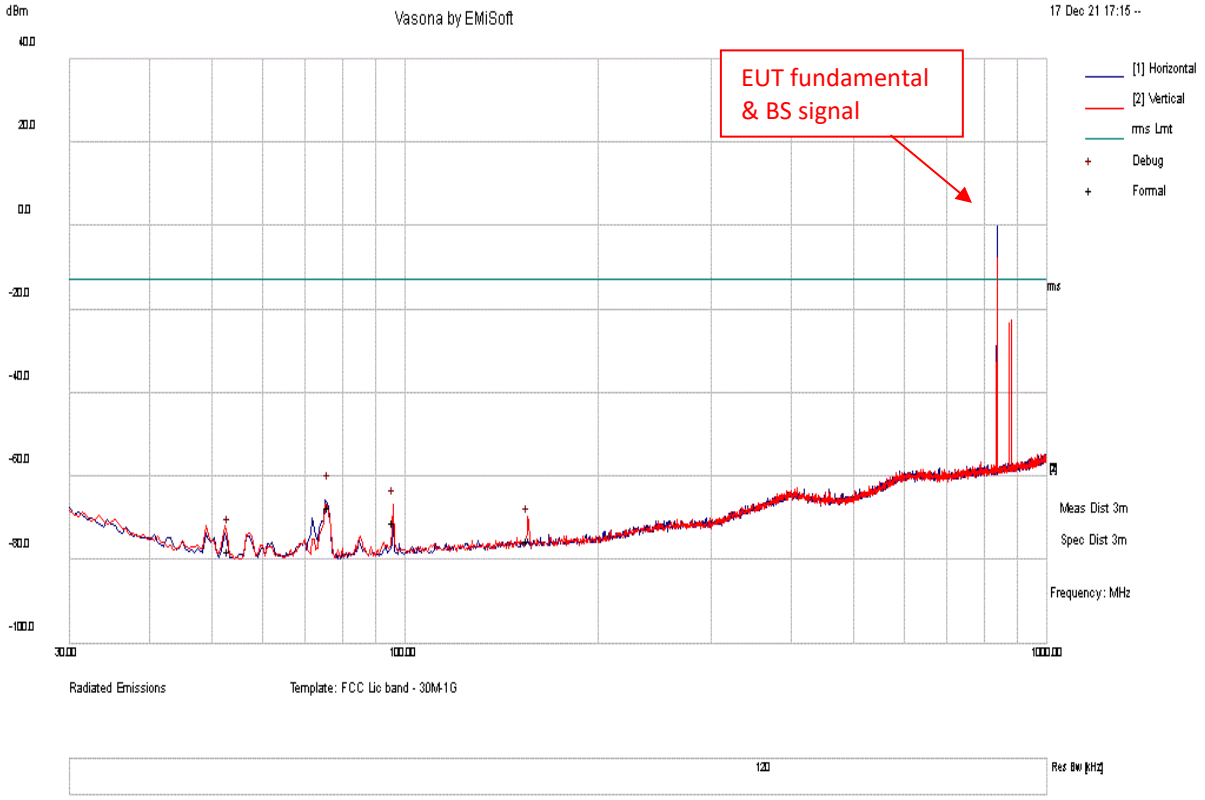
Test Standard:	Part 24E & RSS 133	Mode:	LTE CAT-M1 B2 Mid Channel
Frequency Range:	30 MHz - 1 GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
75.98	-63.60	15.00	-20.20	-68.80	RMS Max	V	140	0	-13.00	-55.80	Pass
49.62	-71.00	14.60	-20.70	-77.20	RMS Max	V	148	144	-13.00	-64.20	Pass
155.78	-73.40	16.10	-17.70	-75.00	RMS Max	V	349	92	-13.00	-62.00	Pass

RADIATED EMISSIONS BELOW 1 GHZ

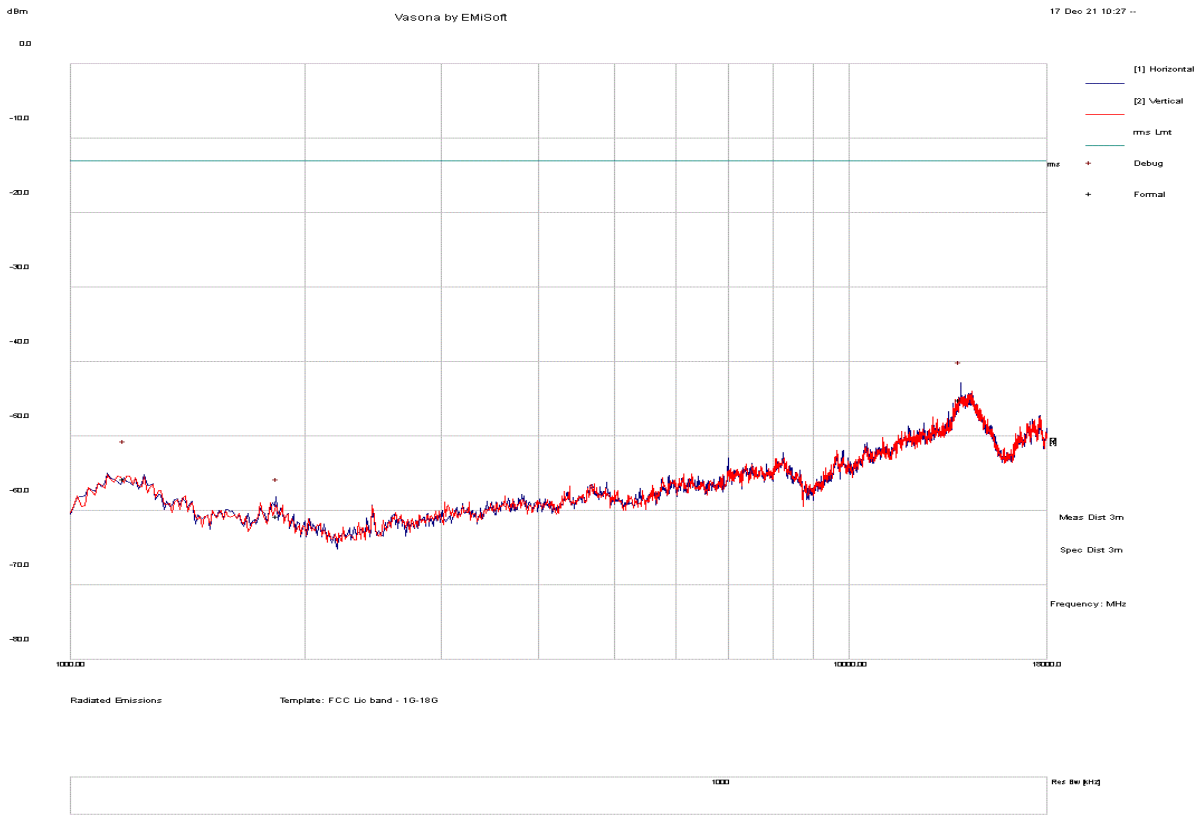
Test Standard:	Part 90	Mode:	LTE CAT-M1 B26 Mid Channel
Frequency Range:	30 MHz - 1 GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
75.98	-62.20	15.00	-20.20	-67.40	RMS Max	V	100	323	-13.00	-54.40	Pass
53.04	-71.40	14.60	-20.90	-77.70	RMS Max	V	116	317	-13.00	-64.70	Pass
95.97	-66.80	15.30	-19.50	-71.00	RMS Max	V	106	142	-13.00	-58.00	Pass
155.60	-73.60	16.10	-17.70	-75.20	RMS Max	V	100	307	-13.00	-62.20	Pass

RADIATED EMISSIONS 1 - 18 GHZ

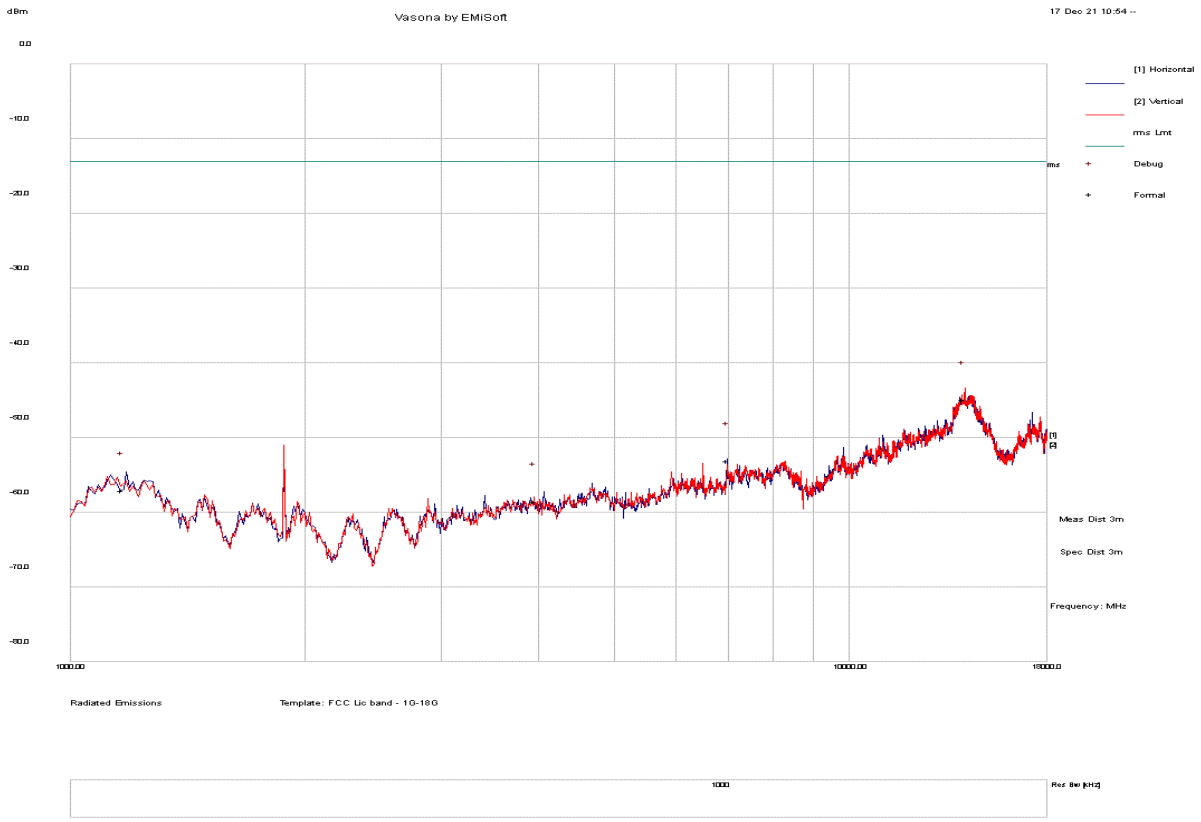
Test Standard:	Part 22 & RSS 132	Mode:	GSM B5 Mid Channel
Frequency Range:	1 GHz – 18GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
1172.30	-66.2	15.7	-5.1	-55.7	RMS Max	V	136	284	-13	-42.7	Pass
13911.68	-78	25.4	7.5	-45.1	RMS Max	V	100	134	-13	-32.1	Pass
1848.19	-68.3	16.2	-8.6	-60.7	RMS Max	V	100	227	-13	-47.7	Pass

RADIATED EMISSIONS 1 - 18 GHZ

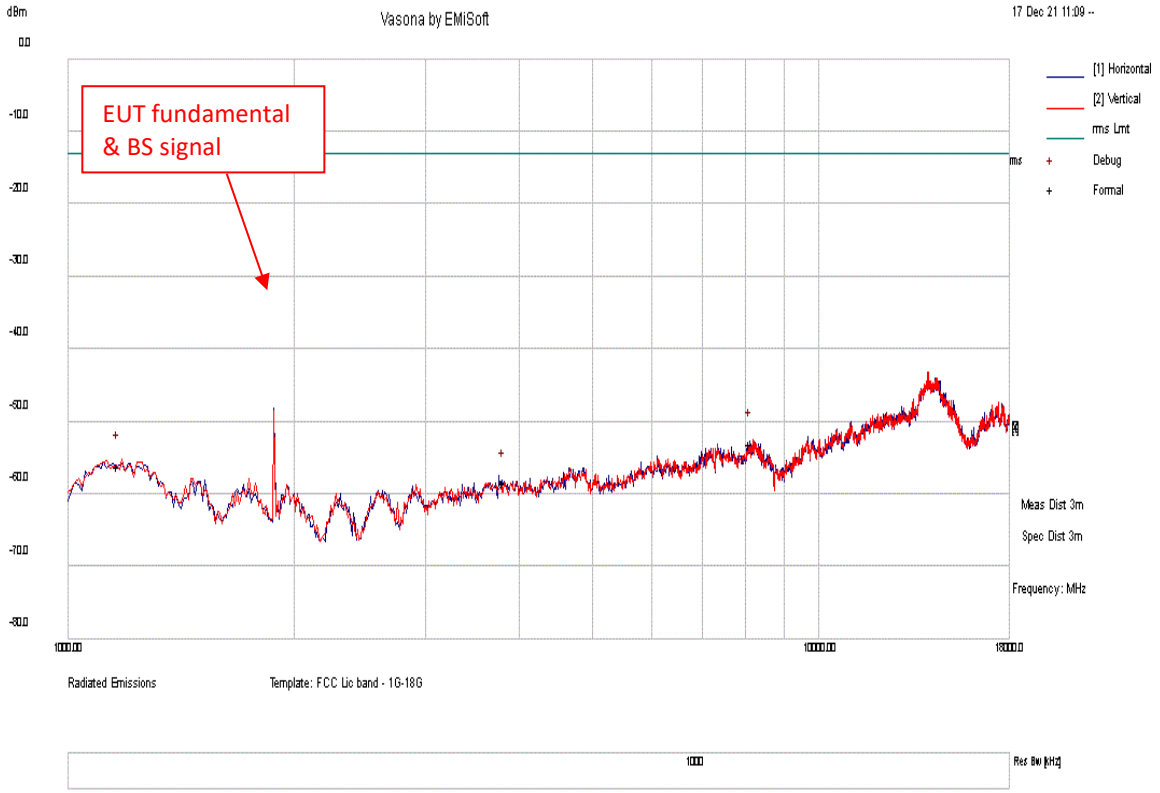
Test Standard:	Part 24E & RSS 133	Mode:	GSM B2 Mid Channel
Frequency Range:	1 GHz – 18GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
1163.86	-67.5	15.7	-5.1	-57	RMS Max	V	154	97	-13	-44	Pass
6982.74	-74.3	20.5	0.8	-53.1	RMS Max	V	124	324	-13	-40.1	Pass
3943.42	-72.9	18.1	-3.6	-58.5	RMS Max	V	111	8	-13	-45.5	Pass
14059.43	-78.5	25.6	8.1	-44.9	RMS Max	V	231	0	-13	-31.9	Pass

RADIATED EMISSIONS 1 - 18 GHZ

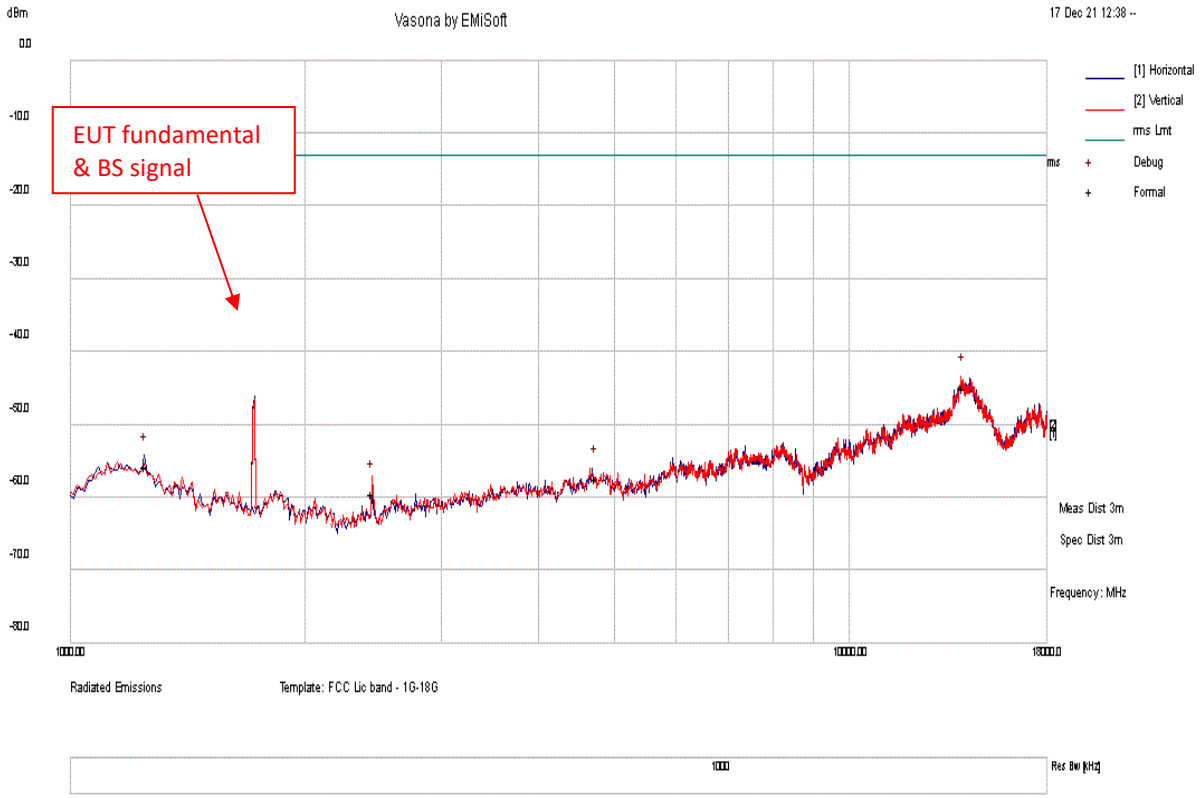
Test Standard:	Part 24E & RSS 133	Mode:	LTE CAT-M1 B2 Mid Channel
Frequency Range:	1 GHz – 18GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
1167.23	-66.7	15.7	-5.1	-56.2	RMS Max	V	140	360	-13	-43.2	Pass
3801.33	-72.5	18	-3.9	-58.5	RMS Max	V	126	307	-13	-45.5	Pass
8106.20	-75	21.6	0.3	-53.1	RMS Max	V	140	360	-13	-40.1	Pass

RADIATED EMISSIONS 1 - 18 GHZ

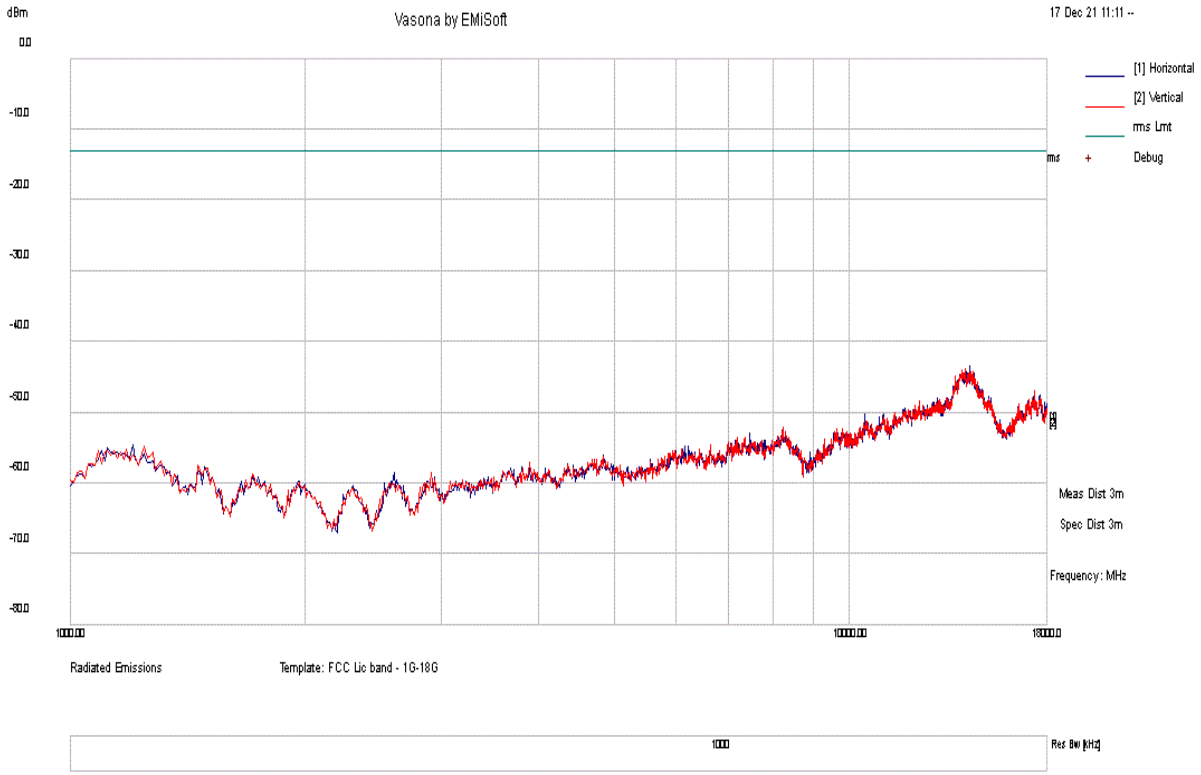
Test Standard:	Part 27 & RSS 139	Mode:	LTE CAT-M1 B4 Mid Channel
Frequency Range:	1 GHz – 18GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
1251.08	-65.9	15.8	-5.7	-55.8	RMS Max	V	107	12	-13	-42.8	Pass
4728.34	-73.5	18.6	-2.6	-57.5	RMS Max	V	278	38	-13	-44.5	Pass
14038.45	-78.4	25.5	8	-44.9	RMS Max	V	107	12	-13	-31.9	Pass
2444.84	-66.8	16.6	-9.4	-59.5	RMS Max	V	278	38	-13	-46.5	Pass

RADIATED EMISSIONS 1 - 18 GHZ

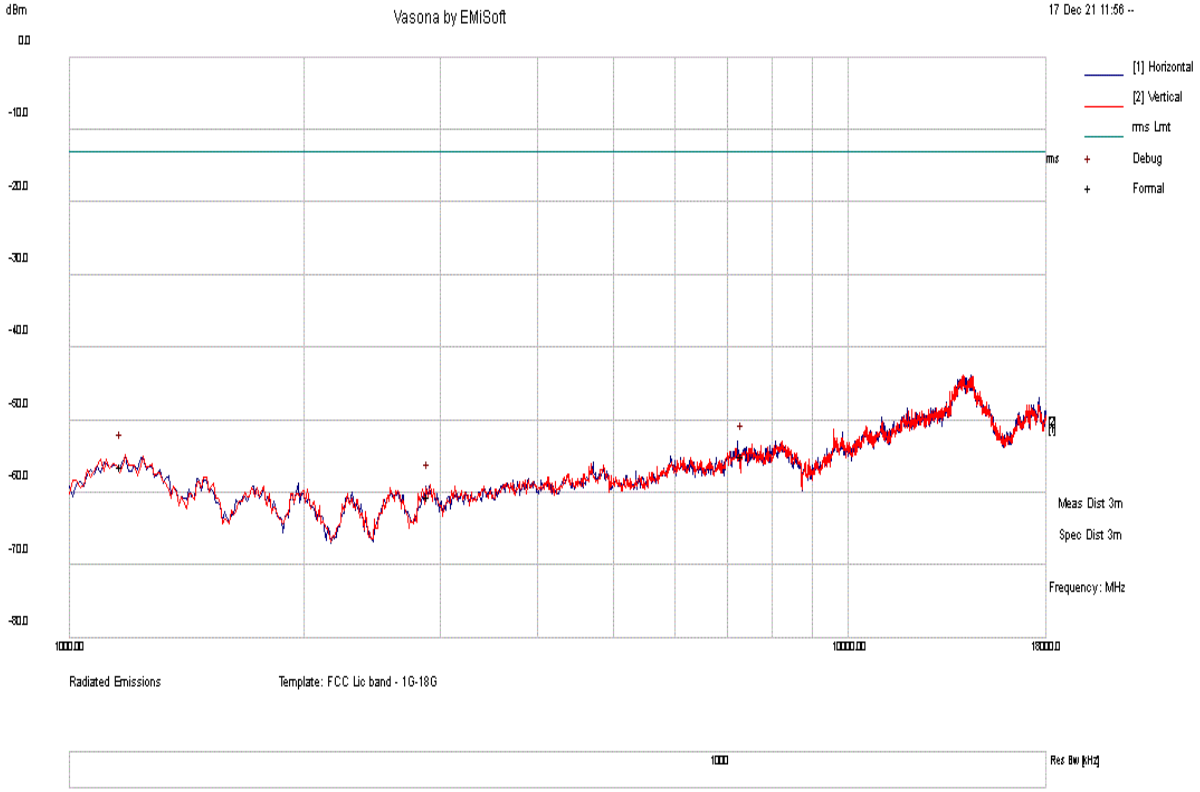
Test Standard:	Part 22 & RSS 132	Mode:	LTE NB-IoT B5 Mid Channel
Frequency Range:	1 GHz – 18GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
1175.693	-66	15.8	-5.7	-55.9	RMS Max	V	106	349	-13	-42.9	Pass
2599.363	-66.4	16.6	-9.4	-59.2	RMS Max	V	340	0	-13	-46.2	Pass
14160.7	-79	25.5	8	-45.5	RMS Max	V	106	349	-13	-32.5	Pass

RADIATED EMISSIONS 1 - 18 GHZ

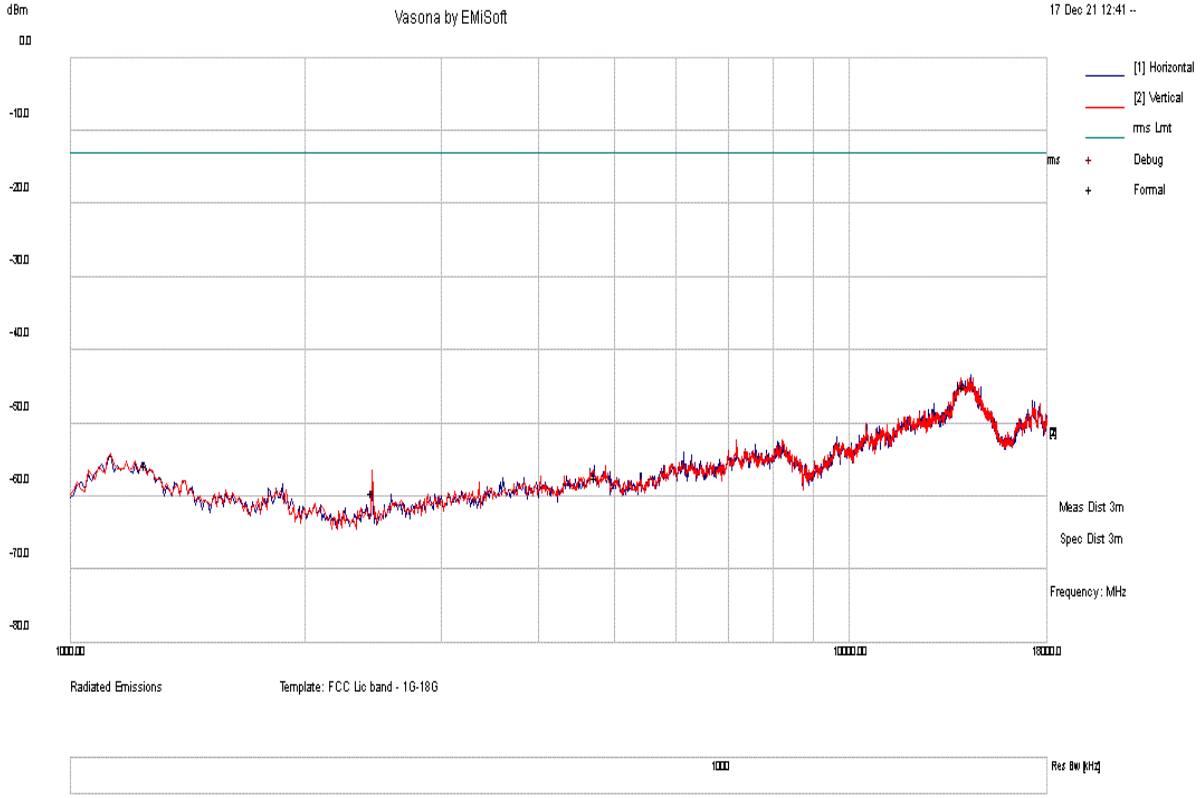
Test Standard:	Part 27 & RSS 130	Mode:	LTE NB-IoT B12 Mid Channel
Frequency Range:	1 GHz – 18GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
1163.86	-66.8	15.7	-5.1	-56.3	RMS Max	V	101	360	-13	-43.3	Pass
2888.58	-69.7	17	-7.7	-60.4	RMS Max	V	195	202	-13	-47.4	Pass
7315.69	-77.4	21.2	1.2	-55	RMS Max	V	101	360	-13	-42	Pass

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	Part 90	Mode:	LTE CAT-M1 B26 Mid Channel
Frequency Range:	1 GHz – 18GHz	Test Date:	12/13/2021-12/21/2021
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	N/A	Test Result:	Pass



Frequency MHz	Raw dBm	Cable Loss	AF dB	Level dBm	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBm	Margin dB	Pass/Fail
1251.08	-65.9	15.8	-5.7	-55.8	RMS Max	V	172	53	-13	-42.8	Pass
4728.34	-73.5	18.6	-2.6	-57.5	RMS Max	V	154	14	-13	-44.5	Pass
14038.45	-78.4	25.5	8	-44.9	RMS Max	V	100	127	-13	-31.9	Pass
2444.84	-66.8	16.6	-9.4	-59.5	RMS Max	V	172	53	-13	-46.5	Pass

18GHz – 40GHz test result

Note: no substantial emission is found other than the noise floor.
Different modes have been verified.

8 EUT and Test Setup Photos

See FCC exhibits

9 Test Instrument List

Equipment	Manufacturer	Model	Instrument Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	10/18/2021	10/18/2022
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A	N/A
Spectrum Analyzer	Keysight	N9020A	MY50110074	06/17/2021	06/17/2022
EMC Test Receiver	R&S	ESL6	100230	06/14/2021	06/14/2022
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	05/04/2021	05/04/2022
LISN (9KHz – 30MHz)	Com-Power	LI-550C	20140050	01/29/2021	01/29/2022
LISN (9KHz – 30MHz)	Com-Power	LI-550C	20140051	01/29/2021	01/29/2022
Bi-Log Antenna	ETS-Lindgren	3142E	217921	11/15/2021	11/15/2022
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	05/14/2021	05/14/2022
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	06/24/2021	06/24/2022
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	07/16/2021	07/16/2022
True RMS Multi-meter	UNI-T	UT181A	C173014829	05/05/2021	05/05/2022
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	05/15/2021	05/15/2022
RF Attenuator	Pasternack	PE7005-3	VL061	07/16/2021	07/16/2022
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392-77150-11	064	07/16/2021	07/16/2022
EM Center Control	ETS-Lindgren	7006-001	160136	N/A	N/A
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A	N/A
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A	N/A
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	05/16/2021	05/16/2022
RE test cable(below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	07/16/2021	07/16/2022
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	07/16/2021	07/16/2022
RE test cable (>18GHz)	Sucoflex	104	344903/4	07/16/2021	07/16/2022
Pulse limiter	Com-Power	LIT-930A	531727	07/16/2021	07/16/2022
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	07/16/2021	07/16/2022
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	07/16/2021	07/16/2022
Wideband Communication	ANRITSU	MT8821C	6262010316	10/23/2021	10/23/2022
Wideband Communication	R&S	CMW500	147508	5/8/2021	5/8/2022