

July 1, 2021

Mobilogix, Inc.  
5500 Trabuco Rd, Suite 150  
Irvine, California 92620

Dear Ramy Mourad,

Enclosed is the EMC Wireless test report for compliance testing of the Mobilogix, Inc., ATD500Y as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 22 Subpart H for Cellular Devices and FCC Part 24 Subpart E for Broadband PCS Devices and Title 47 of the CFR Part 27 Subpart L for Broadband Radio Service (BRS) Devices and Title 47 of the CFR Part 90 Subpart S for Private Land Mobile Radio Service.

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. If you have any questions regarding these results or if we can be of further service to you, please contact me.

Sincerely yours,

*Rheine Nguyen*

Documentation Department  
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: (\Mobilogix, Inc.\WIRS113445-FCC22\_24\_27\_90)



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## **Electromagnetic Compatibility Criteria Test Report**

for the

**Mobilogix, Inc.  
ATD500Y**

**Tested under  
FCC Certification Rules  
Title 47 of the CFR,  
Part 22 Subpart H for Cellular Devices  
Part 24 Subpart E for Broadband PCS Devices  
Part 27 Subpart L for Broadband Radio Service (BRS) Devices  
Part 90 Subpart S for Private Land Mobile Radio Service**

**Report: WIRS113445-FCC22\_24\_27\_90**

**Prepared For:**

**Mobilogix, Inc.  
5500 Trabuco Rd, Suite 150  
Irvine, California 92620**

**Prepared By:  
Eurofins Electrical and Electronic Testing NA, Inc.  
3162 Belick St., Santa Clara, CA 95054**

**Electromagnetic Compatibility Criteria  
Test Report**

for the

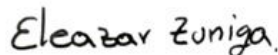
**Mobilogix, Inc.  
ATD500Y**

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Part 27 Subpart L for Broadband Radio Service (BRS) Devices  
Part 90 Subpart S for Private Land Mobile Radio Service**



Arsalan Hasan  
Project Engineer, Electromagnetic Compatibility Lab

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 22 Subpart H and Part 24 Subpart E and Part 27 Subpart L and Part 90 Subpart S of the FCC Rules under normal use and maintenance.



Eleazar Zuniga,  
Director, Wireless Laboratory

## Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	July 1, 2021	Initial Issue.

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## List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dB $\mu$ A	Decibels above one <b>microamp</b>
dB $\mu$ V	Decibels above one <b>microvolt</b>
dB $\mu$ A/m	Decibels above one <b>microamp per meter</b>
dB $\mu$ V/m	Decibels above one <b>microvolt per meter</b>
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
$\mu$ H	<b>microhenry</b>
$\mu$	<b>microfarad</b>
$\mu$ s	<b>microseconds</b>
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts <b>per meter</b>
VCP	Vertical Coupling Plane

# **I. Executive Summary**

## A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Mobilogix, Inc. ATD500Y, with the requirements of Part 22 Subpart H and Part 24 Subpart E and Part 27 Subpart L and Part 90 Subpart S. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the ATD500Y. Mobilogix, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the ATD500Y, has been **permanently** discontinued.

## B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 22 Subpart H and Part 24 Subpart E and Part 27 Subpart L and Part 90 Subpart S, in accordance with Mobilogix, Inc., purchase order number MOB2106.

FCC Reference	Description	Compliance
§2.1049; §22.917; §24.232(d); §90.0209	Occupied Bandwidth	Data valid from module original certification FCC-ID: XMR201910BG95M3
§2.1049, §22.355, §24.238; §90.213	Frequency stability	Data valid from module original certification FCC-ID: XMR201910BG95M3
§22.913(d), §24.323(d); §27.50;	Peak to Average Ratio	Data valid from module original certification FCC-ID: XMR201910BG95M3
§2.1051; §22.917, §24.238; §27.53(m)	Conducted Spurious Emissions at Antenna Terminals and Band Edge	Data valid from module original certification FCC-ID: XMR201910BG95M3
§2.1046; §22.913(a); §24.232; §27.50(d); §90.635(b)	RF Power Output	Compliant
§2.1053; §22.917(a), §24.238; §90.691	Radiated Spurious Emissions	Compliant

### Executive Summary of EMC Compliance Testing

#### Rationale:

Per KDB KDB 996369 D04 “Modular Transmitter Integration Guide – Guidance for Host Product Manufacturers” only spot checks are reported in this filing



## **II. Equipment Configuration**

## A. Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by Mobilogix, Inc. to perform testing on the ATD500Y, under Mobilogix, Inc.'s purchase order number MOB2106.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Mobilogix, Inc., ATD500Y.

The results obtained relate only to the item(s) tested.

<b>Model(s) Tested:</b>	ATD500Y	
<b>Model(s) Covered:</b>	ATD500Y	
<b>Filing Status:</b>	Original	
<b>EUT Specifications:</b>	Primary Power: 3.8 VDC (Battery Powered)	
	FCC ID: 2AH4HATD500Y	
	Module Original Report Number(s): R1907A0446-R1 V1 R1907A0446-R2 R1907A0446-R3 V1	
	Type of Modulations:	QPS`K, 16QAM
	Equipment Code:	PCB
	Technology	TX Frequency Range
	LTE CAT-M1 Band 2	1850 – 1910 MHz
	LTE CAT-M1 Band 4	1710 – 1755 MHz
	LTE CAT-M1 Band 5	824 – 849 MHz
	LTE CAT-M1 Band 12	699 – 716 MHz
	LTE CAT-M1 Band 13	777 – 787 MHz
	LTE CAT-M1 Band 25	1850 – 1915 MHz
	LTE CAT-M1 Band 26	824 – 849 MHz
<b>Analysis:</b>	The results obtained relate only to the item(s) tested.	
<b>Environmental Test Conditions:</b>	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
<b>Evaluated by:</b>	Arsalan Hasan	
<b>Date(s):</b>	July 1, 2021	

**EUT Summary Table**

## B. References

<b>CFR 47, Part 22, Subpart H</b>	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 22: Rules and Regulations for Cellular Devices.
<b>CFR 47, Part 24, Subpart E</b>	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 24: Rules and Regulations for Personal Communications Services
<b>CFR 47, Part 27, Subpart L</b>	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 27: Rules and Regulations for Advanced Wireless Services
<b>CFR 47, Part 90, Subpart S</b>	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 90: Rules and Regulations for Private Land Mobile Radio Service
<b>ANSI C63.4:20014</b>	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
<b>ANSI C63.26: 2015</b>	Compliance Testing of Transmitters Used in Licensed Radio Services
<b>ISO/IEC 17025:2005</b>	General Requirements for the Competence of Testing and Calibration Laboratories
<b>EIA/TIA-603-D-2010</b>	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards
<b>KDB 971168 v02r02</b>	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

## C. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 3162 Belick St., Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology. Radiated Emissions measurements were performed in a 5 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at Eurofins Electrical and Electronic Testing NA, Inc.

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## D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
<b>RF Frequencies</b>	±4.52 Hz	2	95%
<b>RF Power Conducted Emissions</b>	±2.32 dB	2	95%
<b>RF Power Conducted Spurious Emissions</b>	±2.25 dB	2	95%
<b>RF Power Radiated Emissions</b>	±3.01 dB	2	95%

### Uncertainty Calculations Summary

## E. Description of Test Sample

<b>Name of EUT/Model:</b>	ADT500Y
<b>Description of EUT and its intended use:</b>	The EUT is an asset tracker.
<b>Selected Operation Mode(s):</b>	The EUT cellular radio is paired with a call box CMW500 to exercise the radio.
<b>Rationale for the selection of the Operation Mode(s):</b>	The cellular radio requires a base station to establish a radio connection.
<b>Monitoring Method(s):</b>	The display screen on the CMW500 shows the radio connection with info like frequency band, modulation, power etc.
<b>Emissions Class Declaration:</b>	Class B
<b>Configuration(s):</b>	NA
<b>EUT Power Requirement</b>	
<b>Voltage:</b>	12 VDC (Vehicle battery powered)
<b>AC or DC:</b>	DC
<b>Voltage Frequency:</b>	NA
<b>Number of Phases:</b>	NA
<b>Current:</b>	0.1 A
<b>Physical Description</b>	
<b>EUT Arrangement:</b>	Table Top
<b>System with Multiple Chassis?</b>	NA
<b>Size (HxWxD - inches):</b>	20mm x 120mm x 55mm
<b>Weight (lbs):</b>	0.5 lbs
<b>Other Info</b>	
<b>EUT Software (internal to EUT):</b>	Rev 1
<b>Support Software (used by support PC to exercise EUT):</b>	NA
<b>Firmware:</b>	Rev 1
<b>Transmitter Parameters</b>	
<b>Description of your unit:</b>	Cellular
<b>Modulation Type:</b>	QPSK, 16QAM
<b>Number of Channels:</b>	NA
<b>Frequency range (MHz):</b>	Cellular: 1850 MHz – 1910 MHz 824 MHz – 849 MHz 1710 MHz – 1755 MHz 777 MHz – 787 MHz 1850 – 1915 MHz 699 – 716 MHz 698 – 716 MHz BLE: 2402 MHz - 2480 MHz
<b>Antenna Type:</b>	Cellular: SMD (Model Taoglas PCS.06.A)
<b>Antenna Gain (dBi):</b>	Cellular: 1700-1800-1900 MHz (4.3dBi)
<b>PMN:</b>	NA
<b>HVIN:</b>	NA
<b>FVIN:</b>	NA

HMN:	NA
Data Rates:	NA
Expected Power Level:	Cellular: 23 dBm (Conducted)
Number of Antenna:	Cellular: 1
Number of Intentional Transmitters:	Cellular: 1
Number of Certified Intentional Transmitter Modules:	Cellular: 1

#### EUT List

Ref. ID	Slot #	Name/Description	Model Number	Part Number	Serial Number	Rev. #
1	NA	ADT500Y	ADT500Y	NA	NA	1

#### Ports and Cabling

Ref. Id	Port Name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
NA	NA	NA	NA	NA	NA	NA	NA

#### Support Equipment

Ref. ID	Name/Description	Manufacturer	Model Number	Customer Supplied Calibration Data
NA	NA	NA	NA	NA

### F. Modifications

#### a) Modifications to EUT

No modifications were made to the EUT.

#### b) Modifications to Test Standard

No modifications were made to the test standard.

### G. Disposition of EUT

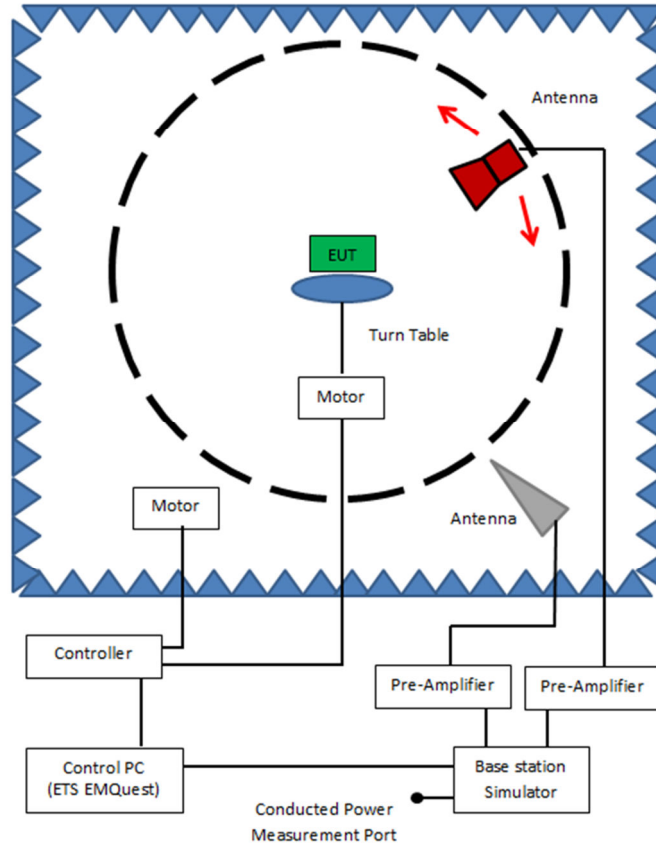
The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Mobilogix, Inc. upon completion of testing.

### **III. Electromagnetic Compatibility Criteria for Intentional Radiators**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 2.1046 Radiated Output Power

<b>Test Requirements:</b>	<p><b>§22.913(a)(2):</b> Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.</p> <p><b>§24.232 (c):</b> 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.</p> <p><b>§27.50 (b)(10):</b> 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.</p> <p><b>§27.50 (b)(10):</b> Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.</p> <p><b>§27.50 (d)(4):</b> 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. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.</p>
<b>Test Procedures:</b>	The EUT was tested according to the procedures of CTIA Test Plan for Over-The-Air performance Version 3.9.2 and ANSI C63.26 (2015) 5.5.3.
<b>Test Results:</b>	The EUT was found compliant with the requirements of this section.
<b>Test Engineer(s):</b>	Arsalan Hasan
<b>Test Date(s):</b>	06/25/2021



**OTA Chamber EIRP Measurement Test Setup, Block Diagram**



## Test Results

### LTE Band 2

Frequency (MHz)	Measured EIRP (dBm)	Limit (dBm)	Result
1880.0	21.16	33.00	Pass

### LTE Band 4

Frequency (MHz)	Measured EIRP (dBm)	Limit (dBm)	Result
1732.5	22.90	30.00	Pass

### LTE Band 5

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
836.5	18.98	16.83	38.45	Pass

### LTE Band 12

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
707.5	21.62	19.47	34.77	Pass

### LTE Band 13

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
782.0	20.26	18.11	34.77	Pass

### LTE Band 25

Frequency (MHz)	Measured EIRP (dBm)	Limit (dBm)	Result
1882.5	20.79	33.00	Pass

### LTE Band 26

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
831.6	19.52	17.37	33.00	Pass

Note:  $ERP = EIRP - 2.15$

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 2.1053 Radiated Spurious Emissions

**Test Requirement(s):** § 2.1053 Measurements required: Field strength of spurious radiation.

§ 2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2) All equipment operating on frequencies higher than 25 MHz.
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
- (4) Other types of equipment as required, when deemed necessary by the Commission.

§ 22.917 Emission limitations Cellular equipment: The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

§ 22.917 (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  $43 + 10 \log(P)$ .

§24.238 (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.

§ 27.53(h): 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.

**§ 27.53(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.

**§ 27.53(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.

#### Test Procedures:

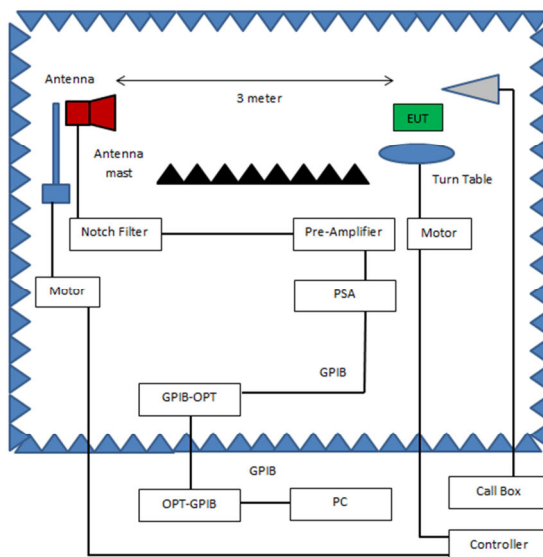
The EUT was tested according to the average power integration procedures of ANSI C63.26 (2015) 5.5.3.

Radiated measurements shall be performed using the test arrangement shown in Figure. After a direct field strength measurement of the maximum emission amplitude level (maximized as described previously), a signal generator and transmit antenna are substituted in place of the EUT, as shown in Figure 7. The output power of the signal generator is adjusted to replicate the maximized signal amplitude measured in the direct field strength measurement. The signal generator power setting is then used to determine the ERP or EIRP of the EUT spurious emission(s). These measurements shall be performed in accordance with the common requirements specified in 5.5.2 and the specific requirements provided in this subclause.

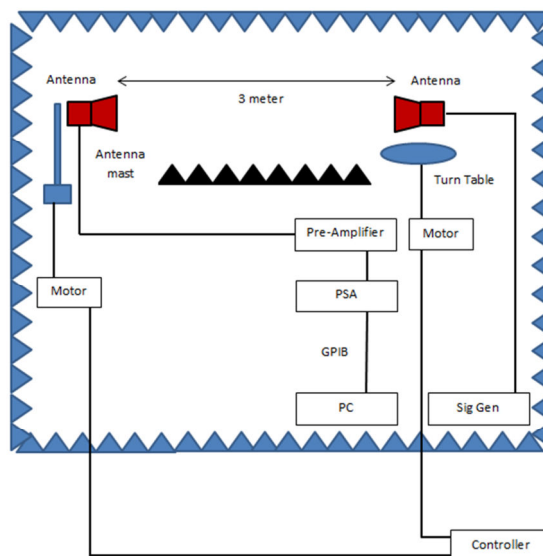
A step-by-step procedure is as follows.

- a) Place the EUT in the center of the turntable. The EUT shall be configured to transmit into the standard non-radiating load (for measuring radiated spurious emissions), connected with cables of minimal length unless specified otherwise. If the EUT uses an adjustable antenna, the antenna shall be positioned to the length that produces the worst case emission at the fundamental operating frequency.
- b) Each emission under consideration shall be evaluated:
  - 1) Raise and lower the measurement antenna in accordance 5.5.2, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
  - 2) Rotate the EUT through  $360^\circ$  to determine the maximum emission level relative to the axial position.
  - 3) Return the turntable to the azimuth where the highest emission amplitude level was observed.
  - 4) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
  - 5) Record the measured emission amplitude level and frequency using the appropriate RBW.

- c) Repeat step b) for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
- d) Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.



**Radiated Spurious Emissions, Block Diagram, Test Setup**



**Radiated Spurious Emissions, Block Diagram, Test Setup**

- e) Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
- f) Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
- g) For each emission that was detected and measured in the initial test [i.e., in step b) and step c)]:
  - 1) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
  - 2) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step b) and step c).
  - 3) Record the output power level of the signal generator when equivalence is achieved in step 2).
- h) Repeat step e) through step g) with the measurement antenna oriented in the opposite polarization.
- i) Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:

$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

$P_e$  = equivalent emission power in dBm

$P_s$  = source (signal generator) power in dBm

NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.

- j) Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:  $\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB}$ . If necessary, the antenna gain can be calculated from calibrated antenna factor information

**Test Results:** The EUT was found compliant with the requirements of this section.

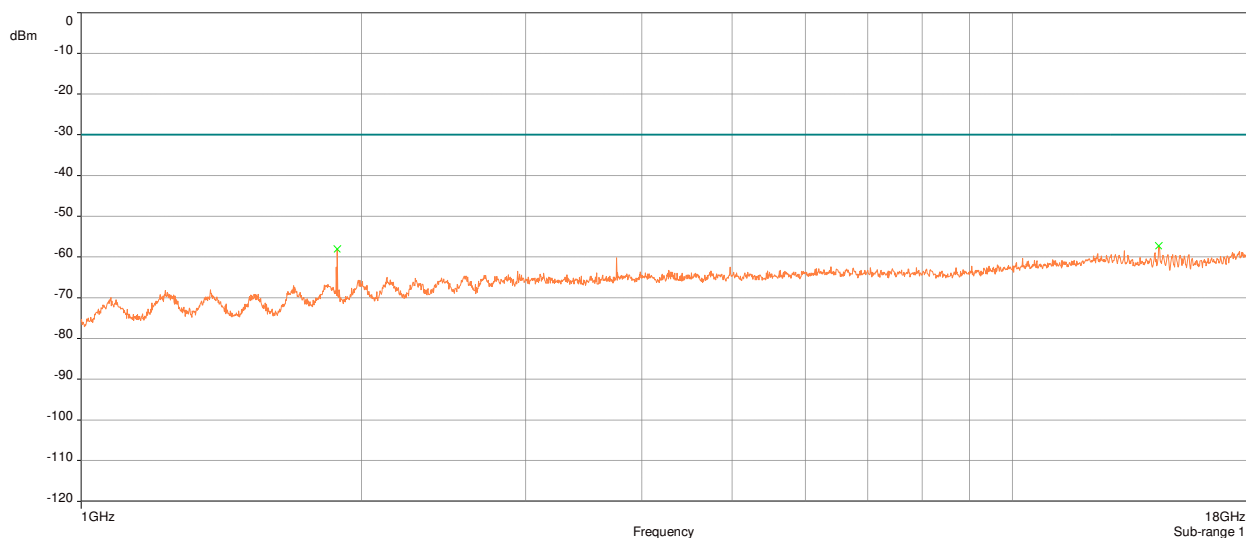
Measurements were made in each configuration. Data is presented for the worse case configuration.

**Test Engineer:** Arsalan Hasan

**Test Date(s):** 06/25/2021

## Radiated Spurious Emissions

### LTE Band 2



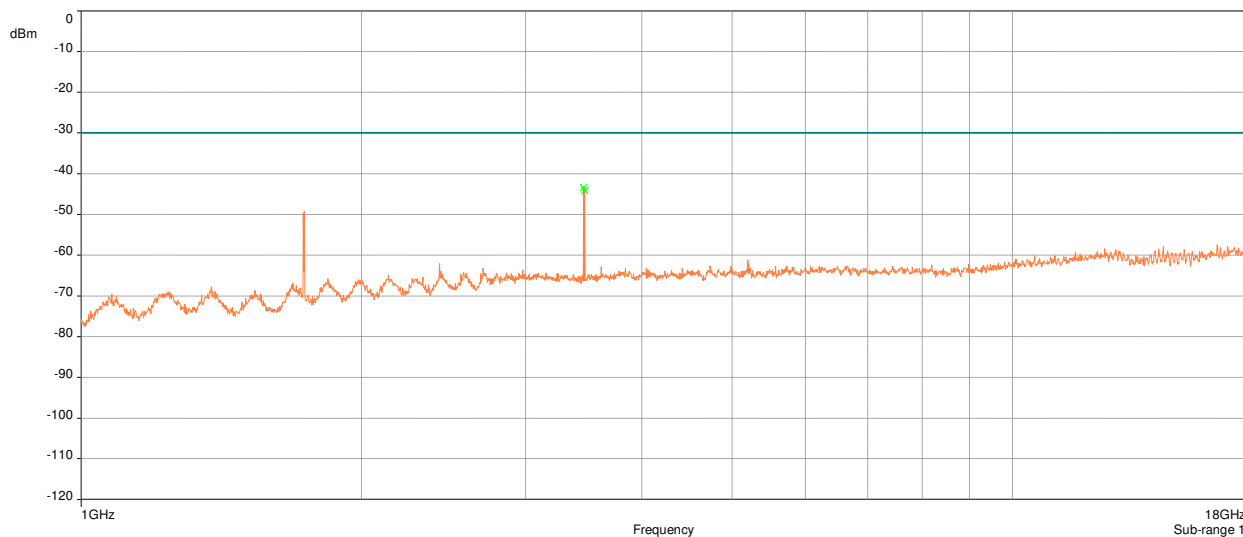
### LTE Band 2

1880.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3760.0	-61.20	36.960	8.222	28.738	Vertical	-32.462	-13	19.462	-63.325
5640.0	-61.40	32.040	10.555	21.485	Vertical	-39.915	-13	26.915	-65.844
7520.0	-63.60	31.890	12.099	19.791	Vertical	-43.809	-13	30.809	-66.046
9400.0	-60.60	28.640	13.455	15.185	Vertical	-45.415	-13	32.415	-64.484
11280.0	-57.40	26.680	13.254	13.426	Vertical	-43.974	-13	30.974	-64.007
13160.0	-52.20	25.880	13.299	12.581	Vertical	-39.619	-13	26.619	-61.175
15040.0	-48.60	24.050	13.915	10.135	Vertical	-38.465	-13	25.465	-62.993
16920.0	-41.30	23.580	12.566	11.014	Vertical	-30.286	-13	17.286	-61.972
18800.0	x	x	x	x	x	x	x	x	x

### Radiated Spurious Emissions, Harmonics using substitution method

**Note:** SL = Path Loss + LNA

## LTE Band 4



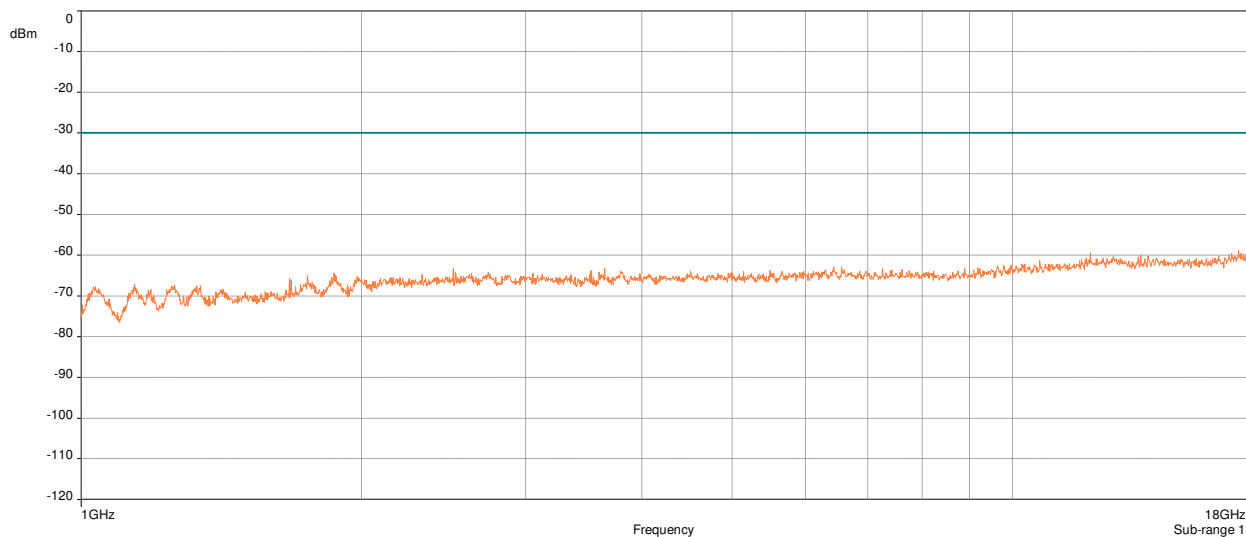
## LTE Band 4

1732.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3465.0	-44.70	36.830	8.544	28.286	Vertical	-16.414	-13	3.414	-45.896
5197.5	-59.40	32.880	10.253	22.627	Vertical	-36.773	-13	23.773	-65.400
6930.0	-60.30	31.040	11.451	19.589	Vertical	-40.711	-13	27.711	-64.102
8662.5	-62.20	30.250	13.046	17.204	Vertical	-44.996	-13	31.996	-65.311
10395.0	-56.40	27.460	13.081	14.379	Vertical	-42.021	-13	29.021	-62.289
12127.5	-53.10	27.430	13.063	14.367	Vertical	-38.733	-13	25.733	-61.119
13860.0	-54.90	23.890	14.385	9.505	Vertical	-45.395	-13	32.395	-64.215
15592.5	-46.30	23.770	13.47	10.300	Vertical	-36.000	-13	23.000	-61.681
17325.0	-43.40	23.680	13.143	10.537	Vertical	-32.863	-13	19.863	-60.199

### Radiated Spurious Emissions, Harmonics using substitution method

**Note:** SL = Path Loss + LNA

## LTE Band 5



## LTE Band 5

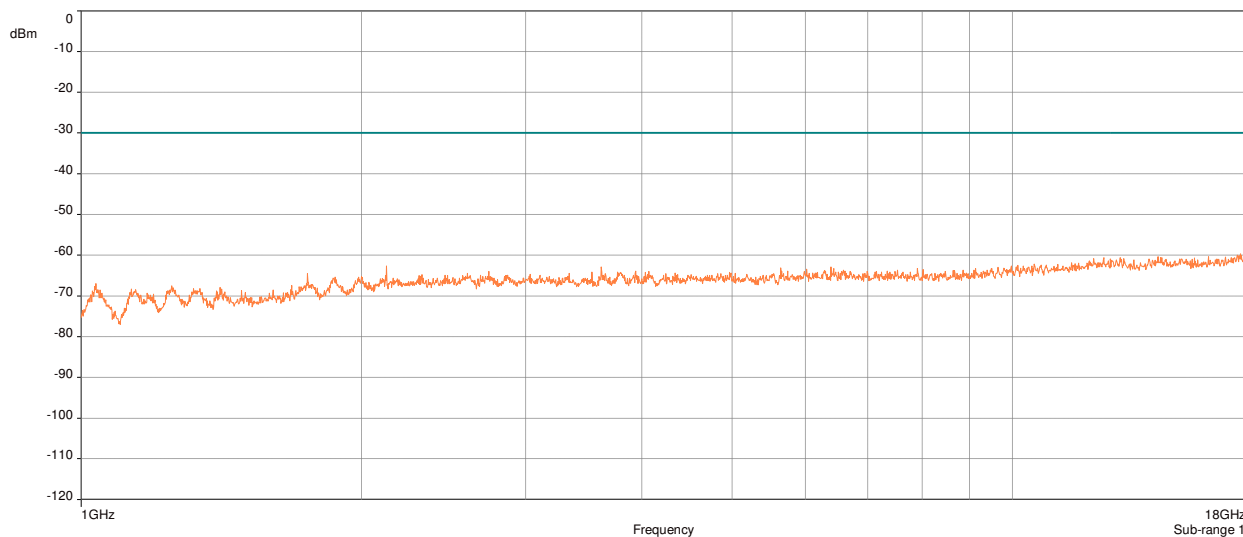
836.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1673.0	-66.40	37.820	5.692	32.128	Vertical	-34.272	-13	21.272	-67.564
2509.5	-62.00	38.580	5.673	32.907	Vertical	-29.093	-13	16.093	-67.716
3346.0	-65.80	38.420	7.787	30.633	Vertical	-35.167	-13	22.167	-67.415
4182.5	-63.70	35.980	9.33	26.650	Vertical	-37.050	-13	24.050	-67.648
5019.0	-61.10	33.950	9.894	24.056	Vertical	-37.044	-13	24.044	-66.611
5855.5	-61.20	32.250	10.688	21.562	Vertical	-39.638	-13	26.638	-66.407
6692.0	-61.30	32.080	11.043	21.037	Vertical	-40.263	-13	27.263	-64.798
7528.5	-63.50	32.100	12.099	20.001	Vertical	-43.499	-13	30.499	-66.197
8365.0	-65.20	30.480	12.82	17.660	Vertical	-47.540	-13	34.540	-67.150

### Radiated Spurious Emissions, Harmonics using substitution method

**Note:** SL = Path Loss + LNA



## LTE Band 12



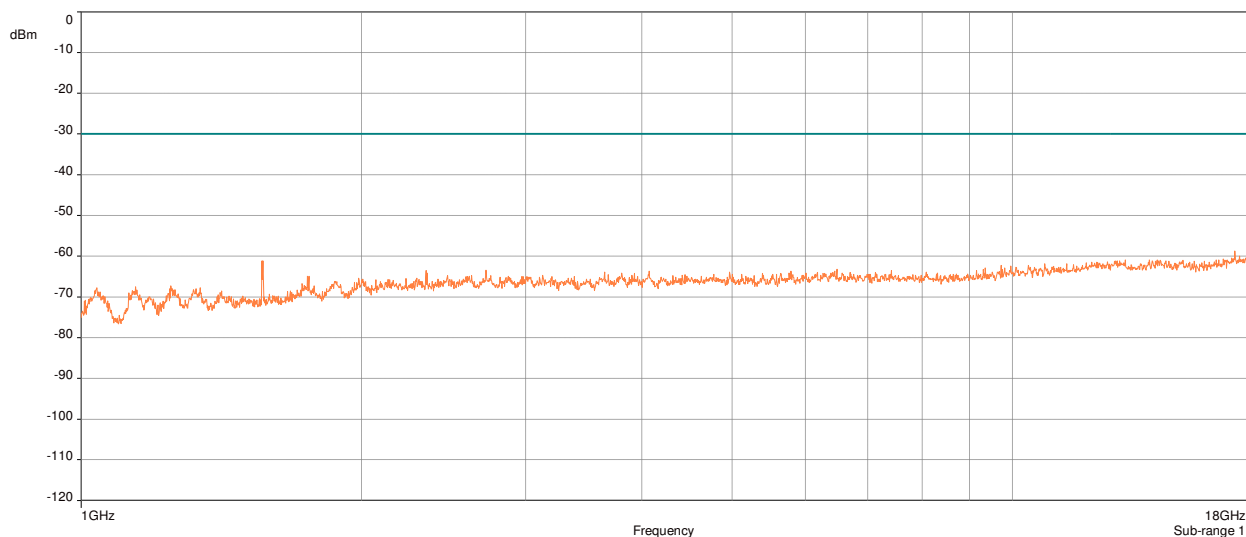
## LTE Band 12

707.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1415.0	-65.60	35.980	4.721	31.259	Vertical	-34.341	-13	21.341	-69.148
2122.5	-62.80	36.270	5.066	31.204	Vertical	-31.596	-13	18.596	-65.046
2830.0	-64.90	37.480	7.104	30.376	Vertical	-34.524	-13	21.524	-66.433
3537.5	-66.00	36.910	8.161	28.749	Vertical	-37.251	-13	24.251	-68.183
4245.0	-62.80	35.160	9.491	25.669	Vertical	-37.131	-13	24.131	-66.909
4952.5	-61.50	33.880	9.858	24.022	Vertical	-37.478	-13	24.478	-66.846
5660.0	-60.00	32.140	10.634	21.506	Vertical	-38.494	-13	25.494	-65.709
6367.5	-62.40	31.070	10.760	20.310	Vertical	-42.090	-13	29.090	-67.769
7075.0	-62.80	31.150	11.741	19.409	Vertical	-43.391	-13	30.391	-66.012

### Radiated Spurious Emissions, Harmonics using substitution method

**Note:** SL = Path Loss + LNA

## LTE Band 13



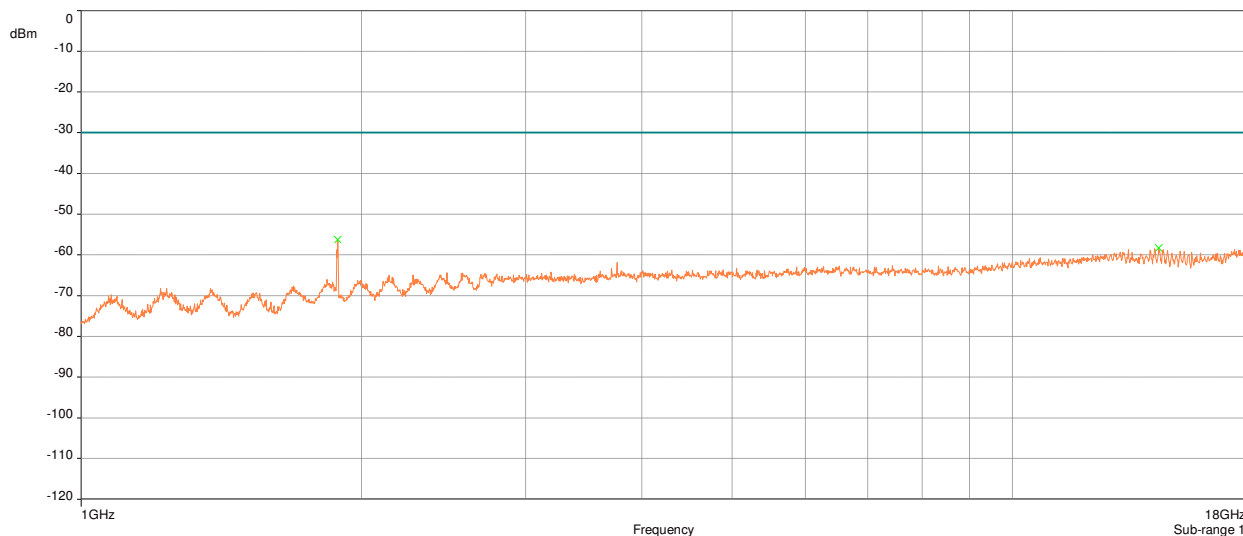
## LTE Band 13

782.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1564.0	-66.10	36.290	5.900	30.390	Vertical	-35.710	-13	22.710	-64.325
2346.0	-59.00	36.660	5.547	31.113	Vertical	-27.887	-13	14.887	-63.588
3128.0	-67.00	37.150	7.019	30.131	Vertical	-36.869	-13	23.869	-66.992
3910.0	-63.80	35.630	8.507	27.123	Vertical	-36.677	-13	23.677	-67.791
4692.0	-59.90	34.190	9.624	24.566	Vertical	-35.334	-13	22.334	-65.144
5474.0	-63.30	32.840	10.549	22.291	Vertical	-41.009	-13	28.009	-68.584
6256.0	-61.40	31.590	10.640	20.950	Vertical	-40.450	-13	27.450	-65.890
7038.0	-64.30	31.270	11.663	19.607	Vertical	-44.693	-13	31.693	-67.441
7820.0	-63.00	30.850	12.235	18.615	Vertical	-44.385	-13	31.385	-65.689

## Radiated Spurious Emissions, Harmonics using substitution method

**Note:** SL = Path Loss + LNA

## LTE Band 25



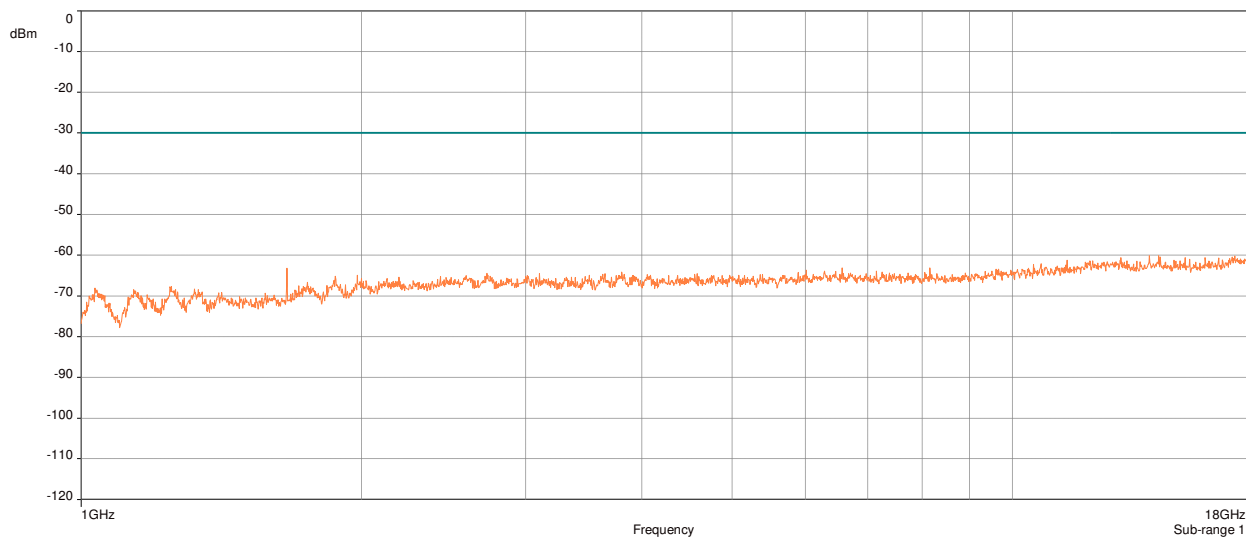
## LTE Band 25

1882.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3765.0	-63.00	36.660	8.222	28.438	Vertical	-34.562	-13	21.562	-65.932
5647.5	-61.70	32.110	10.555	21.555	Vertical	-40.145	-13	27.145	-66.574
7530.0	-62.40	31.440	12.099	19.341	Vertical	-43.059	-13	30.059	-65.738
9412.5	-61.60	28.680	13.455	15.225	Vertical	-46.375	-13	33.375	-65.030
11295.0	-55.20	26.220	13.254	12.966	Vertical	-42.234	-13	29.234	-62.443
13177.5	-54.00	25.350	13.299	12.051	Vertical	-41.949	-13	28.949	-60.974
15060.0	-49.60	23.680	13.923	9.757	Vertical	-39.843	-13	26.843	-63.485
16942.5	-42.40	23.470	12.566	10.904	Vertical	-31.496	-13	18.496	-61.553
18825.0	x	x	x	x	x	x	x	x	x

### Radiated Spurious Emissions, Harmonics using substitution method

**Note:** SL = Path Loss + LNA

## LTE Band 26



## LTE Band 26

831.6	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1663.2	-66.60	37.820	5.869	31.951	Vertical	-34.649	-13	21.649	-67.569
2494.8	-64.50	38.580	5.674	32.906	Vertical	-31.594	-13	18.594	-67.494
3326.4	-65.40	38.420	7.787	30.633	Vertical	-34.767	-13	21.767	-67.096
4158.0	-65.70	35.980	9.330	26.650	Vertical	-39.050	-13	26.050	-69.058
4989.6	-64.00	33.950	9.858	24.092	Vertical	-39.908	-13	26.908	-67.693
5821.2	-61.00	32.250	10.731	21.519	Vertical	-39.481	-13	26.481	-66.665
6652.8	-63.20	32.080	11.043	21.037	Vertical	-42.163	-13	29.163	-67.447
7484.4	-66.20	32.100	11.978	20.122	Vertical	-46.078	-13	33.078	-67.145
8316.0	-65.80	30.480	12.757	17.723	Vertical	-48.077	-13	35.077	-68.085

### Radiated Spurious Emissions, Harmonics using substitution method

**Note:** SL = Path Loss + LNA

## **IV. Test Equipment**

## Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S4075	RADIO COMMUNICATION TESTER	ROHDE & SCHWARZ	CMW500	09/20/2020	09/20/2022
1S2399	TURNTABLE/MAST CONTROLLER	SUNOL SCIENCES	SC99V	SEE NOTE 1	
1S2600	BILOG ANTENNA	TESEQ	CBL6112D	03/19/2021	03/19/2022
1S2733	BILOG ANTENNA	TESEQ	CBL6112D	06/05/2021	06/05/2022
1S3826	DRG HORN ANTENNA	ETS-LINDGREN	3117	12/03/2020	12/03/2022
1S2198	DRG HORN ANTENNA	ETS-LINDGREN	3117	10/07/2019	10/07/2021
1S2003	PXA Signal Analyzer	Keysight	N9030B	09/15/2020	09/15/2021
1S2587	PRE AMPLIFIER	AML COMMUNICATIONS	AML0126L3801	SEE NOTE 1	
1S2653	AMPLIFIER	SONOMA INSTRUMENT	310 N	SEE NOTE 1	
1S2486	5 METER CHAMBER	PANASHIELD - ETS	5M	SEE NOTE 2	
1S2643	SIGNAL GENERATOR	Anritsu	MG3694B	07/13/2020	07/13/2021
1S2802	OTA Chamber 2	ETS Lindgren	AMS-8900	02/24/2020	02/24/2022
1S2809	Signal Analyzer	Anritsu	MS2830A	01/12/2021	01/12/2022
1S2811	Radio Communication Analyzer	Anritsu	MT8821C	12/15/2020	12/15/2021
1S2851	System Amplifier Module	ETS Lindgren	SAM-5	SEE NOTE 1	
1S2845	EMCenter Switch	ETS Lindgren	3.4.7	SEE NOTE 1	

## Test Equipment List

Note 1: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

Note 2: Latest NSA and VSWR data available upon request.

**End of Report**