

August 15, 2021

Siretta Limited
Basingstoke Road, Spencers Wood
Reading RG7 1PW, United Kingdom

Dear Paul Gibbons,

Enclosed is the EMC Wireless test report for compliance testing of the Siretta Limited, ZETA-NEP-LTEM (GL) 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).

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

Sincerely yours,

Rheine Nguyen

Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: (\Siretta\WIRS113121-FCC22_24_27)



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Electromagnetic Compatibility Criteria Test Report

for the

**Siretta Limited
ZETA-NEP-LTEM (GL)**

**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**

Report: WIR113121-FCC22_24_27

Prepared For:

**Siretta Limited
Basingstoke Road, Spencers Wood
Reading RG7 1PW, United Kingdom**

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

Electromagnetic Compatibility Criteria Test Report

for the

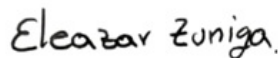
Siretta Limited
ZETA-NEP-LTEM (GL)

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



Nate Park
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 of the FCC Rules under normal use and maintenance.



Eleazar Zuniga,
Director, Wireless Laboratory

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	August 15, 2021	Initial Issue.

Table of Contents

I.	Executive Summary	1
	A. Purpose of Test	2
	B. Executive Summary	2
II.	Equipment Configuration	3
	A. Overview	4
	B. References	5
	C. Test Site	5
	D. Measurement Uncertainty	6
	E. Description of Test Sample	6
	F. Modifications	8
	Modifications to EUT	8
	Modifications to Test Standard	8
	G. Disposition of EUT	8
III.	Electromagnetic Compatibility Criteria for Intentional Radiators	9
	§ 2.1046 Effective Radiated Power	10
	§ 2.1053 Radiated Spurious Emissions	14
IV.	Test Equipment	33

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Siretta Limited, ZETA-NEP-LTEM (GL), with the requirements of Part 22 Subpart H and Part 24 Subpart E and Part 27 Subpart L. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with PVG-04 technical requirements, the following data is presented in support of the Certification of the ZETA-NEP-LTEM (GL). Siretta Limited should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the ZETA-NEP-LTEM (GL), 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, in accordance with Siretta Limited, purchase order number UK0341220637. All tests were conducted using measurement procedure.

FCC Reference	Description	Compliance
§2.1049; §22.917; §24.232(d);	Occupied Bandwidth	Data valid from module original certification of FCC ID: RI7ME910C1WW
§2.1049, §22.355, §24.238;	Frequency stability	Data valid from module original certification of FCC ID: RI7ME910C1WW
§22.913(d), §24.323(d); §27.50;	Peak to Average Ratio	Data valid from module original certification of FCC ID: RI7ME910C1WW
§2.1051; §22.917, §24.238; §27.53(m)	Conducted Spurious Emissions at Antenna Terminals and Band Edge	Data valid from module original certification of FCC ID: RI7ME910C1WW
§2.1046; §22.913(a); §24.232; §27.50(d);	RF Power Output	Compliant
§2.1053; §22.917(a), §24.238;	Radiated Spurious Emissions	Compliant

Executive Summary of EMC Compliance Testing

Rationale:

Per 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 Siretta Limited to perform testing on the ZETA-NEP-LTEM (GL), under purchase order number UK0341220637.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of Siretta Limited, ZETA-NEP-LTEM (GL).

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

Model(s) Tested:	ZETA-NEP-LTEM (GL)	
Model(s) Covered:	ZETA-NEP-LTEM (GL)	
Filing Status:	Original	
EUT Specifications:	Primary Power: Voltage: 12 V external power supply. AC or DC: DC Voltage Frequency: NA Number of Phases: 1 Current: 0.5 Amp	
	Module Original Report Number(s): Report: 1860156R-HPUSP17V00 Report: 1860156R-HPUSP50V00	
	Type of Modulations:	QPSK, 16QAM
	Equipment Code:	PCB
	Technology	TX Frequency Range
	GSM 850	824 – 849 MHz
	GSM 1900	1850 – 1910 MHz
	LTE Band 2	1850 – 1910 MHz
	LTE Band 4	1710 – 1755 MHz
	LTE Band 5	824 – 849 MHz
	LTE Band 12	699 – 716 MHz
	LTE Band 13	777 – 787 MHz
	LTE Band 26	824 – 849 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	

	Barometric Pressure: 860-1060 mbar
Evaluated by:	Nate Park
Date(s):	August 15, 2021

EUT Summary Table
B. References

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

Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.02) in accordance with ISO/IEC 17025:2017.

Eurofins MET Laboratories Inc. (Eurofins E&E North America) is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

D. Measurement Uncertainty

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

Uncertainty Calculations Summary

E. Description of Test Sample

Name of EUT/Model:	ZETA-NEP-LTEM (GL)
Description of EUT and Intended Use:	The Siretta range of ZETA industrial low power modem solutions are a family of cellular enabled modems which have been designed to an industrial specification to allow an easy connection for remote devices over the internet. The family of products supports a standard set of features including low power operation with a wide range and robust power supply, RS232 and USB serial connectivity and extended temperature spec as standard.
Selected Operation Mode(s):	Establish an internet connection between a connected serial device and a remote server using the embedded TCP stack within the modem. Serial device can communicate with the remote location over the established TCP link. Once the socket connection has been established from the ZETA modem the device will be able to send and receive data to and from the server as desired. For testing purposes the device can continuously stream data to the server or receive continuously streamed data from the server.
Rational for the selection of the Operation Mode(s):	The maximum noise would be generated from transmission of data over the TCP network at maximum power. Maximum power would be achieved from a low signal strength.
Monitoring Method(s):	The method to establish error free transmission is to observe the data received at the receiver and make sure it matches the data that was sent from the source. A mismatch of data would mean that the error correction had failed or that there was a serial conflict.
Emissions Class Declaration:	Class A
Configurations:	Serial data streaming using RS232 serial port. Connected at 115200 baud rate with 8 data bits, 1 stop bit and no parity with no flow control enabled. Connection to server to be established with embedded TCP stack using a predefined set of AT commands sent over the serial port.
EUT Power Requirement	
Voltage:	12V
AC or DC:	DC
Voltage Frequency:	NA
Number of Phases:	1
Current:	0.5A
Physical Description	
EUT Arrangement:	Table Top
System with Multiple Chassis?	False
Size (HxWxD) inches:	93mm x 67mm x 28mm

Weight (lbs):	0.5
Highest Internal Frequency (MHz):	48MHz
Other Info	
EUT Software (Internal to EUT):	NA
Support Software (used by support PC to exercise EUT):	Tera term
Firmware:	M0B.800005
Transmitter Parameters	
Description of your unit:	Hybrid
Modulation Type:	FDD
Number of Channels:	13
Frequency Range (Mhz):	700MHz-2100MHz
Antenna Type:	Omni-Directional
Antenna Gain (dbi):	1dBi
PMN:	NA
HVIN:	NA
FVIN:	NA
HMN:	NA
Data Rates:	56kbps - 1Mbps
Expected Power Level:	Class 4
Number of Antenna:	1
Number of Intentional Transmitters:	1
Number of Certified Intentional Transmitter Modules:	1 of FCC ID: RI7ME910C1WW

EUT List

Ref.ID	Slot#	Name/Description	Model Number	Part Number	Serial Number	Rev. #
EU01	1	DUT1	ZETA-NEP-LTEM (GL)	--	--	--

*There is no port and cabling information for the EUT.

*No support equipment list is required for testing.

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 (if any), submitted to the Electromagnetic Compatibility Lab for testing was returned to Siretta Limited upon completion of testing.

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

Output Power

Test Requirements: **§22.913(a)(2):** 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.

§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.

§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.

§27.50 (b)(10): 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.

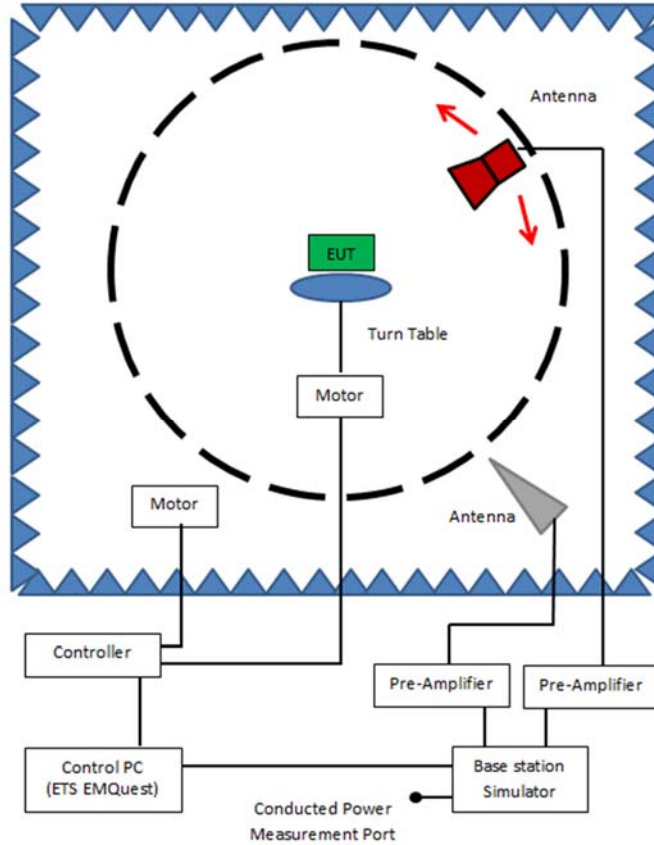
§27.50 (d)(4): Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height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

Test Procedures: 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.

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

Test Engineer: Nate Park

Test Date(s): 07/30/2021



OTA Chamber EIRP Measurement Test Setup, Block Diagram

Output Power Measurement Test Results

GSM 850

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
836.5	29.11	26.96	38.45	Pass

GSM 1900

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
1880	30.87	NA	33.00	Pass

LTE Band 2 (QPSK)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
1880	25.85	NA	33.00	Pass

LTE Band 4 (QPSK)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
1732.5	25.11	NA	30.00	Pass

LTE Band 5 (QPSK)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
836.5	26.53	24.38	38.45	Pass

LTE Band 12 (QPSK)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
707.5	23.34	21.19	34.77	Pass

LTE Band 13 (QPSK)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
782	24.87	22.72	34.77	Pass

LTE Band 26 (QPSK)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
836.5	26.26	24.11	38.45	Pass

LTE Band 2 (16QAM)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
1880	27.25	NA	33.00	Pass

LTE Band 4 (16QAM)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
1732.5	24.25	NA	30.00	Pass

LTE Band 5 (16QAM)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
836.5	24.45	22.30	38.45	Pass

LTE Band 12 (16QAM)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
707.5	23.39	21.24	34.77	Pass

LTE Band 13 (16QAM)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
782	23.97	21.82	34.77	Pass

LTE Band 26 (16QAM)

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
836.5	25.36	23.21	38.45	Pass

Electromagnetic Compatibility Criteria for Intentional Radiators

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 effective 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:

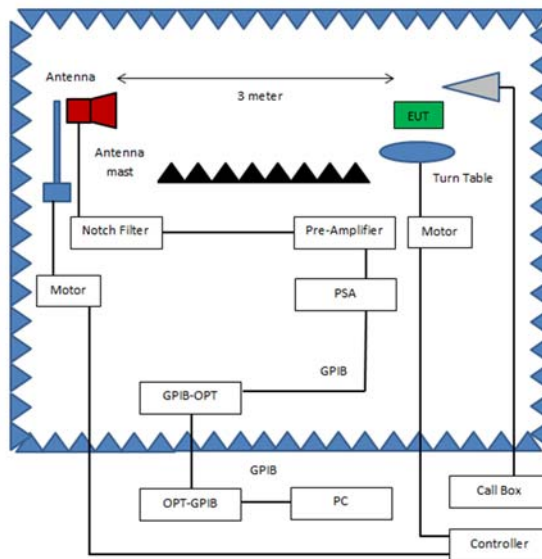
The EUT was tested according to the average power integration procedures of ANSI C63.26 (2015) 5.5.3.

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.

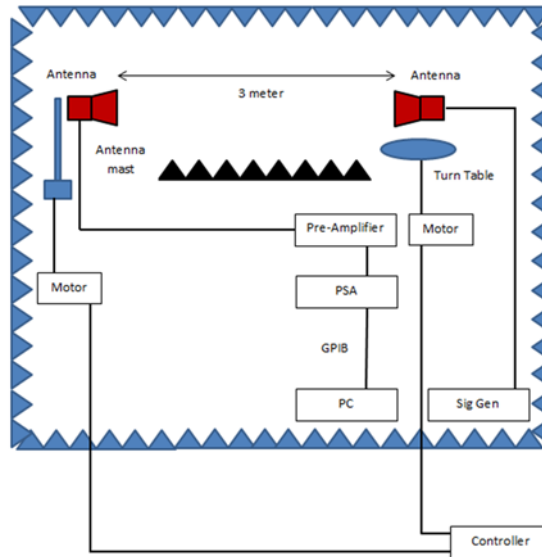
A step-by-step procedure is as follows.

- 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° 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: gain (dBd) = gain (dBi) - 2.15 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.

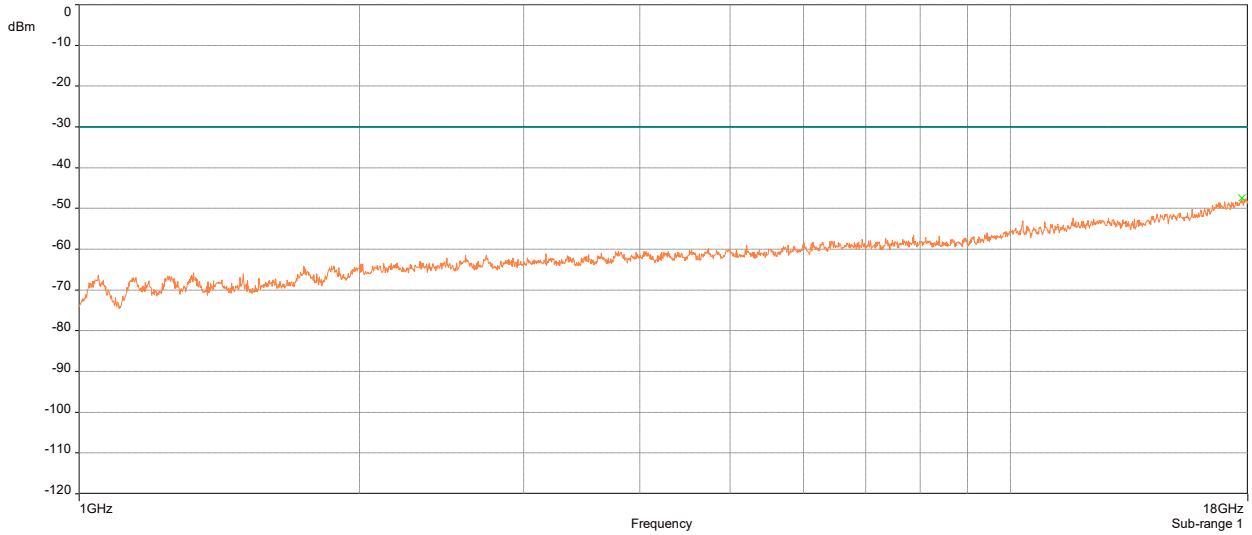
Measurements were made in each configuration. Data is presented for the worse case configuration.

Test Engineer: Nate Park

Test Date(s): 07/29/2021

Radiated Spurious Emissions

GSM 850

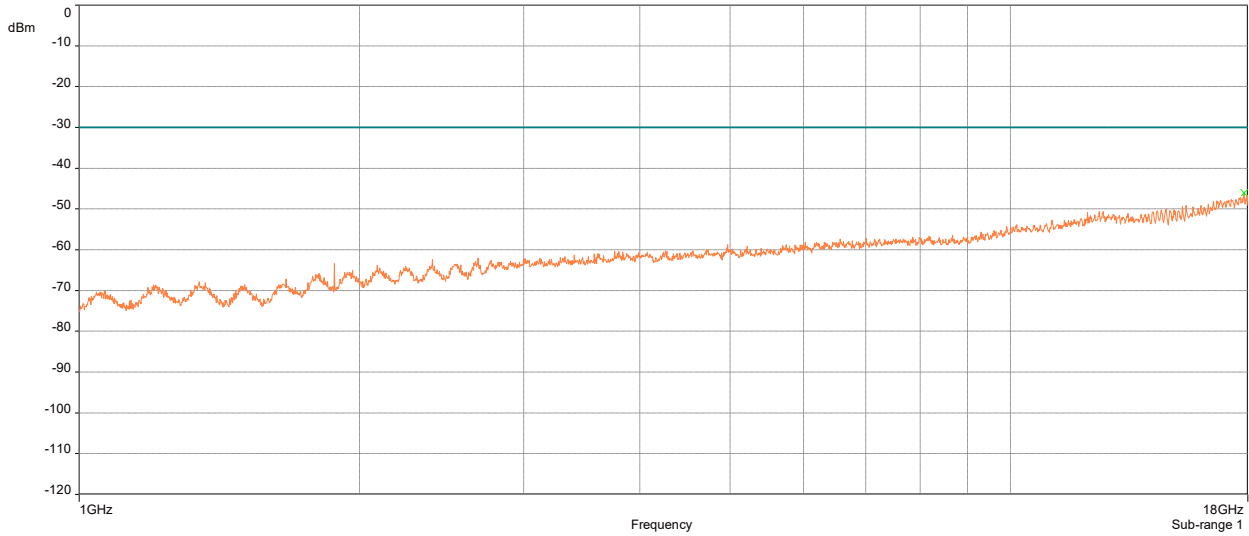


GSM 850, RSE 1GHz-18GHz

837.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1674.0	-68.00	35.700	5.692	30.008	Vertical	-37.992	-13	24.992	-69.320
2511.0	-49.00	36.230	5.618	30.612	Vertical	-18.388	-13	5.388	-65.190
3348.0	-50.38	36.020	7.787	28.233	Vertical	-22.147	-13	9.147	-63.130
4185.0	-51.38	34.370	9.330	25.040	Vertical	-26.340	-13	13.340	-64.110
5022.0	-48.74	31.540	9.894	21.646	Vertical	-27.094	-13	14.094	-61.350
5859.0	-49.34	30.400	10.688	19.712	Vertical	-29.628	-13	16.628	-62.150
6696.0	-49.15	29.350	11.043	18.307	Vertical	-30.843	-13	17.843	-59.250
7533.0	-49.96	29.060	12.099	16.961	Vertical	-32.999	-13	19.999	-59.380
8370.0	-50.96	26.120	12.820	13.300	Vertical	-37.660	-13	24.660	-59.620

Radiated Spurious Emissions, Harmonics using substitution method

GSM 1900

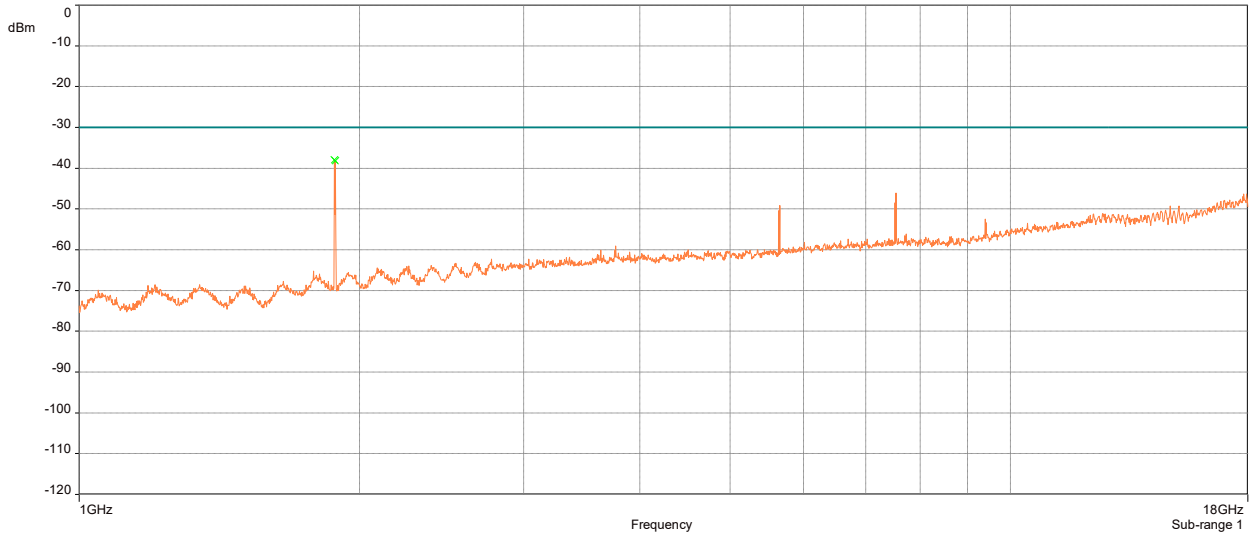


GSM 1900, RSE 1GHz-18GHz

1880.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3760.0	-46.74	34.460	8.222	26.238	Vertical	-20.502	-13	7.502	-60.330
5640.0	-47.74	30.260	10.555	19.705	Vertical	-28.035	-13	15.035	-62.250
7520.0	-50.74	29.280	12.099	17.181	Vertical	-33.559	-13	20.559	-59.090
9400.0	-42.84	25.600	13.455	12.145	Vertical	-30.695	-13	17.695	-57.590
11280.0	-42.54	24.220	13.254	10.966	Vertical	-31.574	-13	18.574	-55.250
13160.0	-37.62	23.840	13.299	10.541	Vertical	-27.079	-13	14.079	-54.640
15040.0	-29.92	21.510	13.915	7.595	Vertical	-22.325	-13	9.325	-52.670
16920.0	-24.54	20.650	12.566	8.084	Vertical	-16.456	-13	3.456	-51.360
18800.0	x	x	x	x	x	x	x	x	x

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 2 QPSK

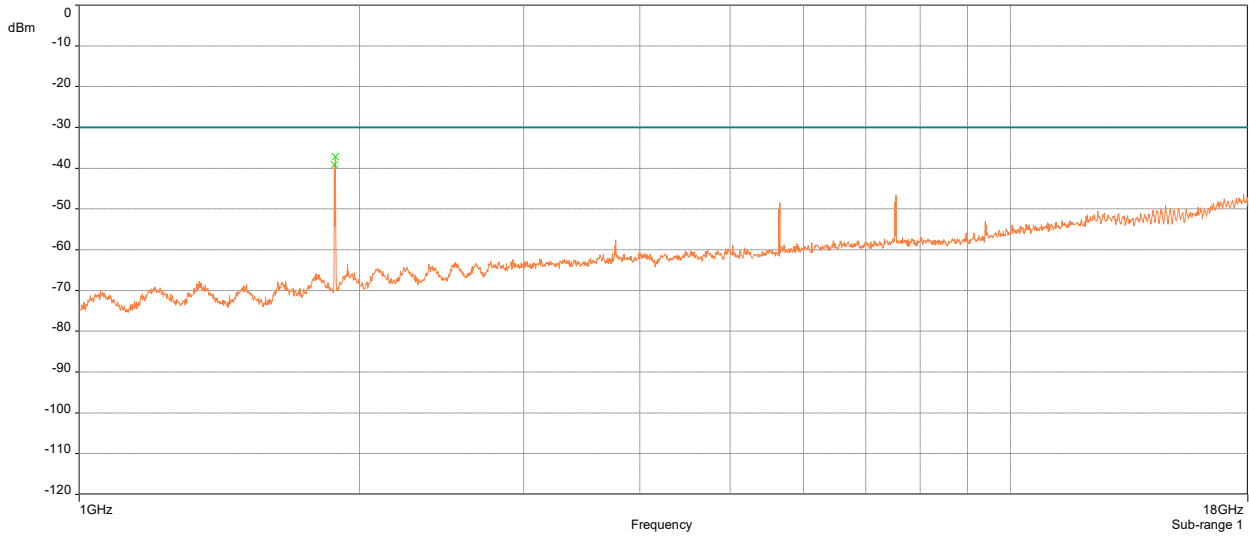


LTE Band 2 QPSK, RSE 1GHz-18GHz

1880.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3760.0	-47.13	34.460	8.222	26.238	Vertical	-20.892	-13	7.892	-61.219
5640.0	-47.33	30.260	10.555	19.705	Vertical	-27.625	-13	14.625	-61.753
7520.0	-47.82	29.280	12.099	17.181	Vertical	-30.639	-13	17.639	-56.296
9400.0	-44.19	25.600	13.455	12.145	Vertical	-32.045	-13	19.045	-58.189
11280.0	-44.59	24.220	13.254	10.966	Vertical	-33.624	-13	20.624	-55.923
13160.0	-39.89	23.840	13.299	10.541	Vertical	-29.349	-13	16.349	-55.309
15040.0	-31.00	21.510	13.915	7.595	Vertical	-23.405	-13	10.405	-52.621
16920.0	-24.50	20.650	12.566	8.084	Vertical	-16.416	-13	3.416	-52.100
18800.0	x	x	x	x	x	x	x	x	x

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 2 16 QAM

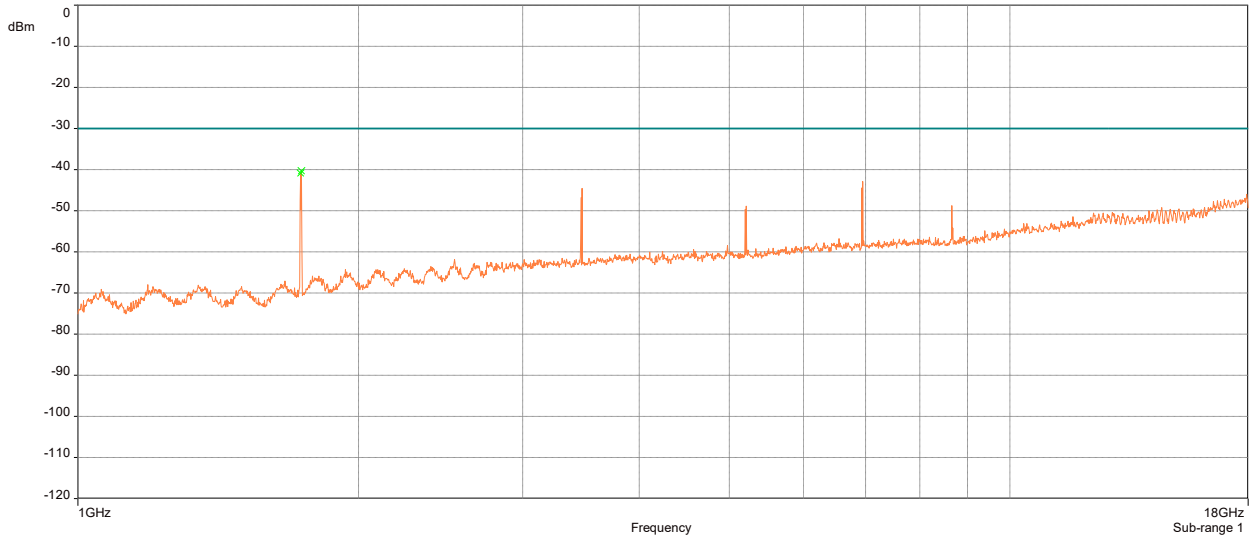


LTE Band 2 16QAM, RSE 1GHz-18GHz

1880.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3760.0	-48.93	34.460	8.222	26.238	Vertical	-22.692	-13	9.692	-62.730
5640.0	-41.74	30.260	10.555	19.705	Vertical	-22.035	-13	9.035	-55.910
7520.0	-49.78	29.280	12.099	17.181	Vertical	-32.599	-13	19.599	-58.050
9400.0	-44.47	25.600	13.455	12.145	Vertical	-32.325	-13	19.325	-58.480
11280.0	-45.09	24.220	13.254	10.966	Vertical	-34.124	-13	21.124	-56.310
13160.0	-39.51	23.840	13.299	10.541	Vertical	-28.969	-13	15.969	-54.790
15040.0	-32.49	21.510	13.915	7.595	Vertical	-24.895	-13	11.895	-54.040
16920.0	-24.22	20.650	12.566	8.084	Vertical	-16.136	-13	3.136	-50.710
18800.0	x	x	x	x	x	x	x	x	x

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 4 QPSK

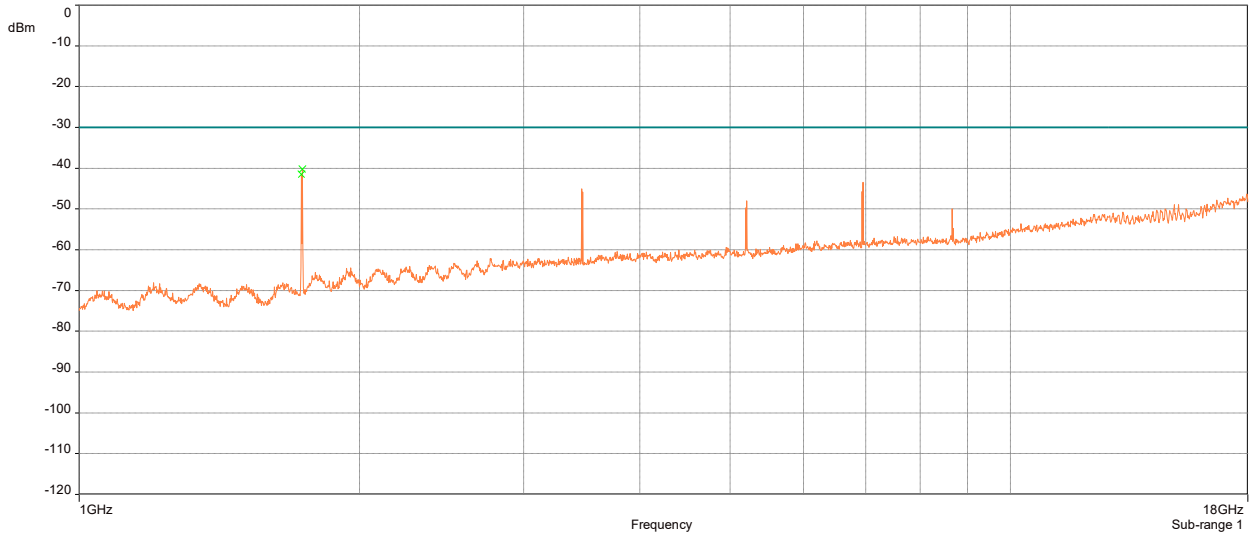


LTE Band 4 QPSK, RSE 1GHz-18GHz

1732.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3465.0	-43.30	35.500	8.544	26.956	Vertical	-16.344	-13	3.344	-50.370
5197.5	-41.59	30.320	10.253	20.067	Vertical	-21.523	-13	8.523	-55.740
6930.0	-40.98	28.520	11.451	17.069	Vertical	-23.911	-13	10.911	-52.620
8662.5	-43.38	26.100	13.046	13.054	Vertical	-30.326	-13	17.326	-53.820
10395.0	-44.45	23.160	13.081	10.079	Vertical	-34.371	-13	21.371	-56.260
12127.5	-41.05	23.530	13.063	10.467	Vertical	-30.583	-13	17.583	-53.810
13860.0	-37.37	22.390	14.385	8.005	Vertical	-29.365	-13	16.365	-54.270
15592.5	-29.24	21.810	13.470	8.340	Vertical	-20.900	-13	7.900	-52.150
17325.0	-23.85	20.340	13.143	7.197	Vertical	-16.653	-13	3.653	-49.650

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 4 16QAM

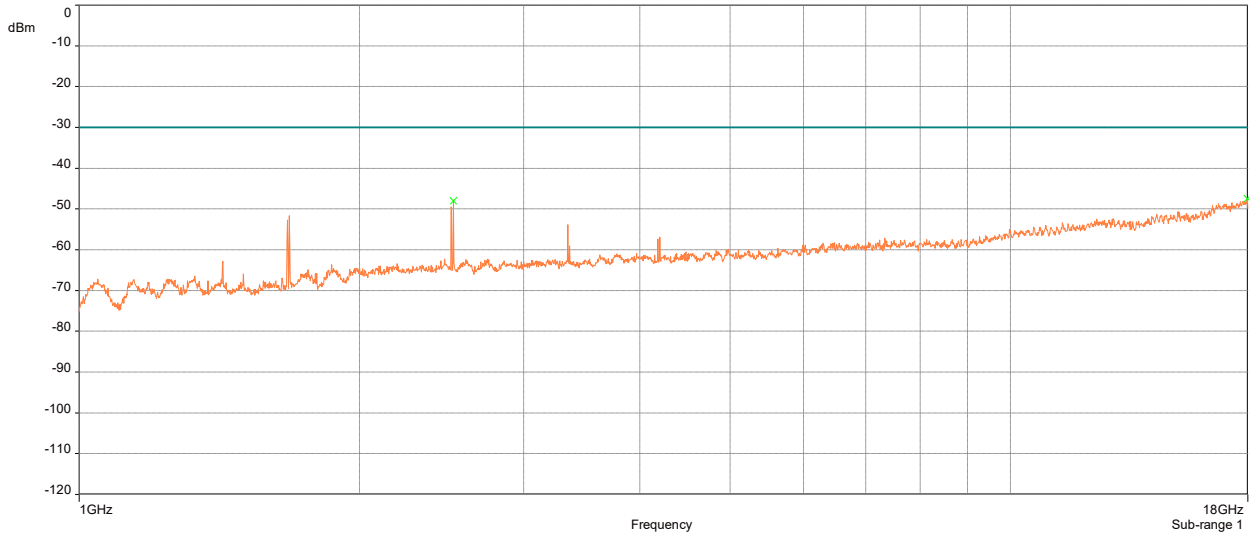


LTE Band 4 16QAM, RSE 1GHz-18GHz

1732.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3465.0	-43.70	35.500	8.544	26.956	Vertical	-16.744	-13	3.744	-47.322
5197.5	-40.30	30.320	10.253	20.067	Vertical	-20.233	-13	7.233	-54.432
6930.0	-41.98	28.520	11.451	17.069	Vertical	-24.911	-13	11.911	-53.629
8662.5	-47.98	26.100	13.046	13.054	Vertical	-34.926	-13	21.926	-58.324
10395.0	-44.45	23.160	13.081	10.079	Vertical	-34.371	-13	21.371	-56.202
12127.5	-41.24	23.530	13.063	10.467	Vertical	-30.773	-13	17.773	-54.045
13860.0	-36.96	22.390	14.385	8.005	Vertical	-28.955	-13	15.955	-53.805
15592.5	-29.45	21.810	13.470	8.340	Vertical	-21.110	-13	8.110	-52.416
17325.0	-22.50	20.340	13.143	7.197	Vertical	-15.303	-13	2.303	-49.241

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 5 QPSK

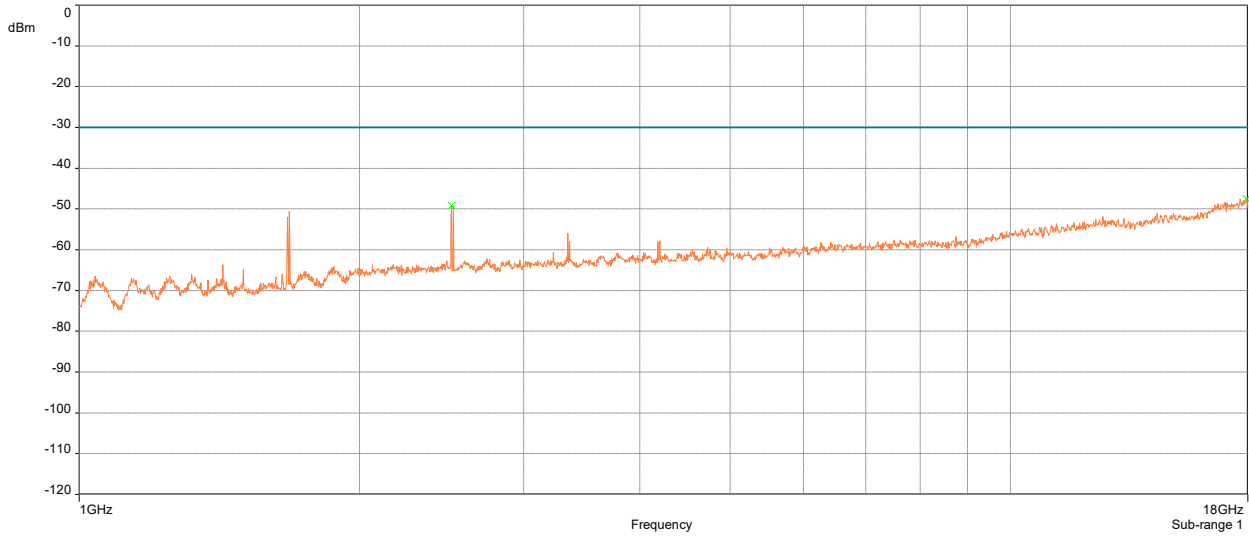


LTE Band 5 QPSK, RSE 1GHz-18GHz

836.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1673.0	-53.70	35.280	5.692	29.588	Vertical	-24.112	-13	11.112	-53.440
2509.5	-46.20	35.840	5.673	30.167	Vertical	-16.033	-13	3.033	-50.360
3346.0	-49.90	35.430	7.787	27.643	Vertical	-22.257	-13	9.257	-63.170
4182.5	-51.69	33.450	9.330	24.120	Vertical	-27.570	-13	14.570	-63.650
5019.0	-48.98	30.560	9.894	20.666	Vertical	-28.314	-13	15.314	-61.800
5855.5	-48.49	29.940	10.688	19.252	Vertical	-29.238	-13	16.238	-61.220
6692.0	-49.60	28.940	11.043	17.897	Vertical	-31.703	-13	18.703	-60.020
7528.5	-50.61	29.140	12.099	17.041	Vertical	-33.569	-13	20.569	-59.640
8365.0	-50.01	26.050	12.820	13.230	Vertical	-36.780	-13	23.780	-58.760

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 5 16QAM

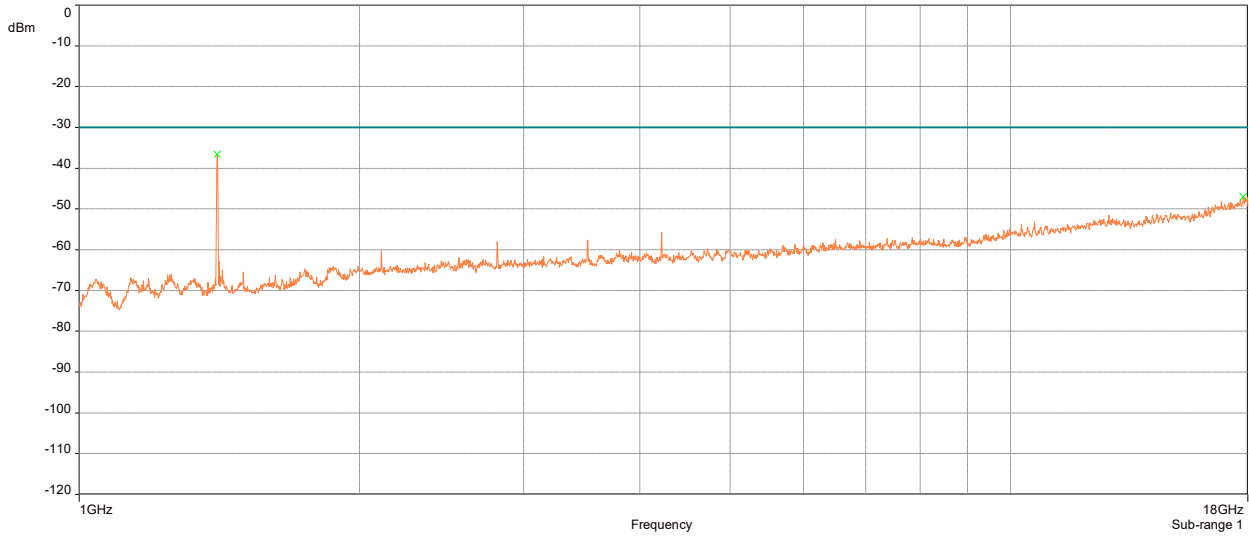


LTE Band 5 16QAM, RSE 1GHz-18GHz

836.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1673.0	-53.00	35.280	5.692	29.588	Vertical	-23.412	-13	10.412	-52.470
2509.5	-51.00	35.840	5.673	30.167	Vertical	-20.833	-13	7.833	-54.990
3346.0	-49.90	35.430	7.787	27.643	Vertical	-22.257	-13	9.257	-63.120
4182.5	-51.69	33.450	9.330	24.120	Vertical	-27.570	-13	14.570	-63.780
5019.0	-49.28	30.560	9.894	20.666	Vertical	-28.614	-13	15.614	-62.180
5855.5	-49.08	29.940	10.688	19.252	Vertical	-29.828	-13	16.828	-61.810
6692.0	-49.60	28.940	11.043	17.897	Vertical	-31.703	-13	18.703	-60.200
7528.5	-51.61	29.140	12.099	17.041	Vertical	-34.569	-13	21.569	-60.650
8365.0	-51.61	26.050	12.820	13.230	Vertical	-38.380	-13	25.380	-60.210

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 12 QPSK

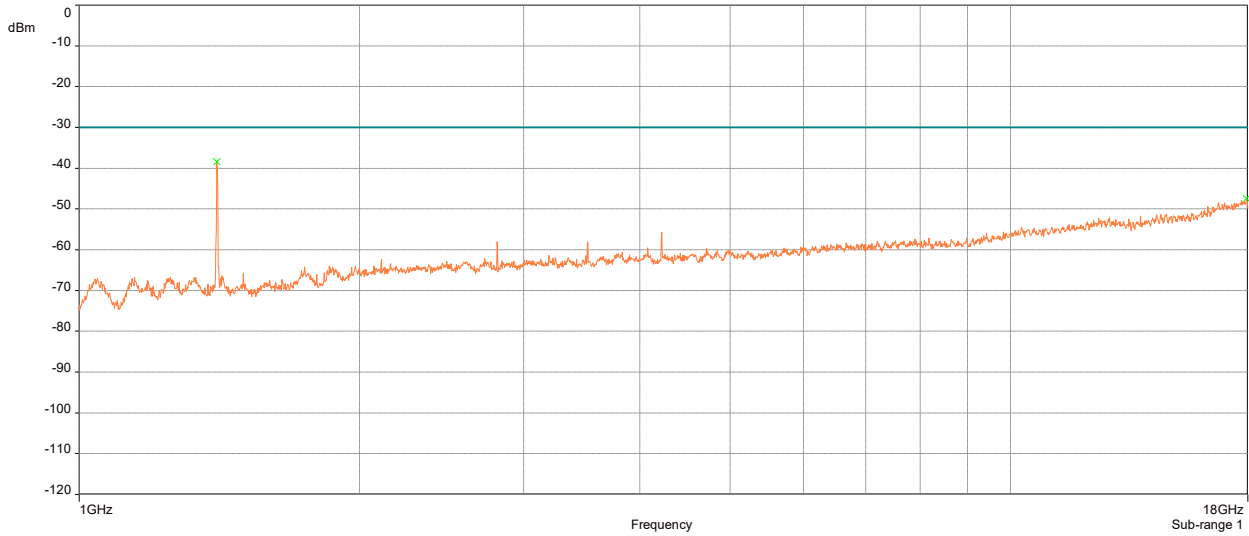


LTE Band 12 QPSK, RSE 1GHz-18GHz

701.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1403.0	-69.54	35.150	4.646	30.504	Vertical	-39.036	-13	26.036	-68.750
2104.5	-63.54	35.560	5.015	30.545	Vertical	-32.995	-13	19.995	-64.790
2806.0	-62.54	35.820	7.070	28.750	Vertical	-33.790	-13	20.790	-65.480
3507.5	-57.84	35.030	8.161	26.869	Vertical	-30.971	-13	17.971	-62.730
4209.0	-50.84	33.290	9.491	23.799	Vertical	-27.041	-13	14.041	-63.300
4910.5	-50.06	30.570	9.896	20.674	Vertical	-29.386	-13	16.386	-63.070
5612.0	-48.77	30.200	10.555	19.645	Vertical	-29.125	-13	16.125	-62.360
6313.5	-47.11	29.630	10.640	18.990	Vertical	-28.120	-13	15.120	-59.850
7015.0	-49.61	28.320	11.663	16.657	Vertical	-32.953	-13	19.953	-61.180

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 12 16QAM

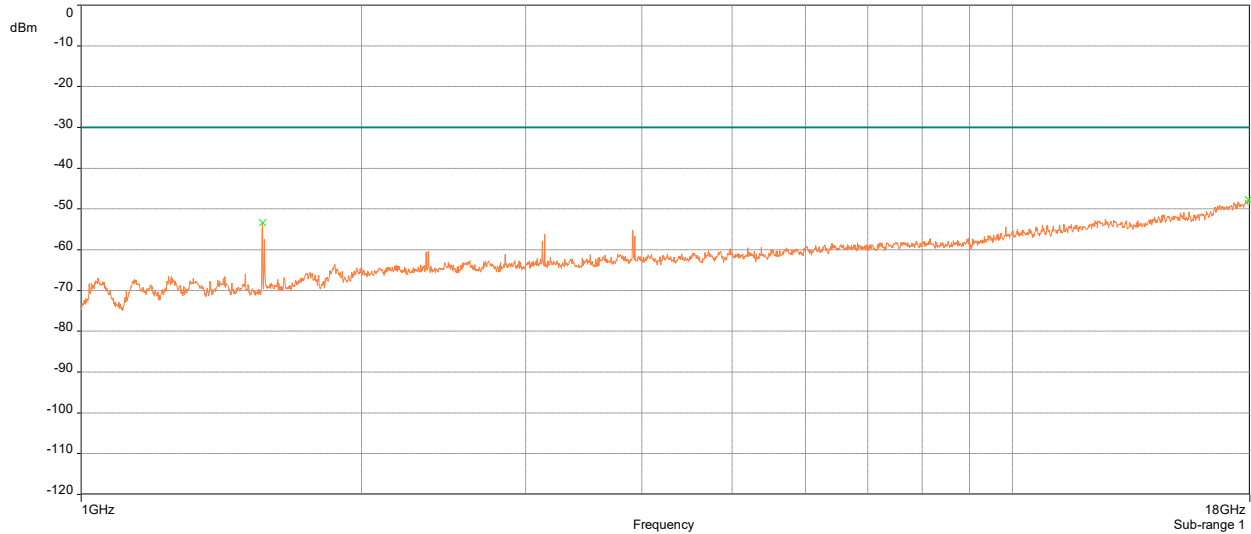


LTE Band 12 16QAM, RSE 1GHz-18GHz

701.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1403.0	-59.30	35.150	4.646	30.504	Vertical	-28.796	-13	15.796	-58.960
2104.5	-66.54	35.560	5.015	30.545	Vertical	-35.995	-13	22.995	-66.030
2806.0	-62.84	35.820	7.070	28.750	Vertical	-34.090	-13	21.090	-65.880
3507.5	-59.04	35.030	8.161	26.869	Vertical	-32.171	-13	19.171	-63.690
4209.0	-51.84	33.290	9.491	23.799	Vertical	-28.041	-13	15.041	-63.970
4910.5	-50.06	30.570	9.896	20.674	Vertical	-29.386	-13	16.386	-63.100
5612.0	-48.77	30.200	10.555	19.645	Vertical	-29.125	-13	16.125	-62.450
6313.5	-48.77	29.630	10.640	18.990	Vertical	-29.780	-13	16.780	-61.210
7015.0	-48.51	28.320	11.663	16.657	Vertical	-31.853	-13	18.853	-60.120

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 13 QPSK

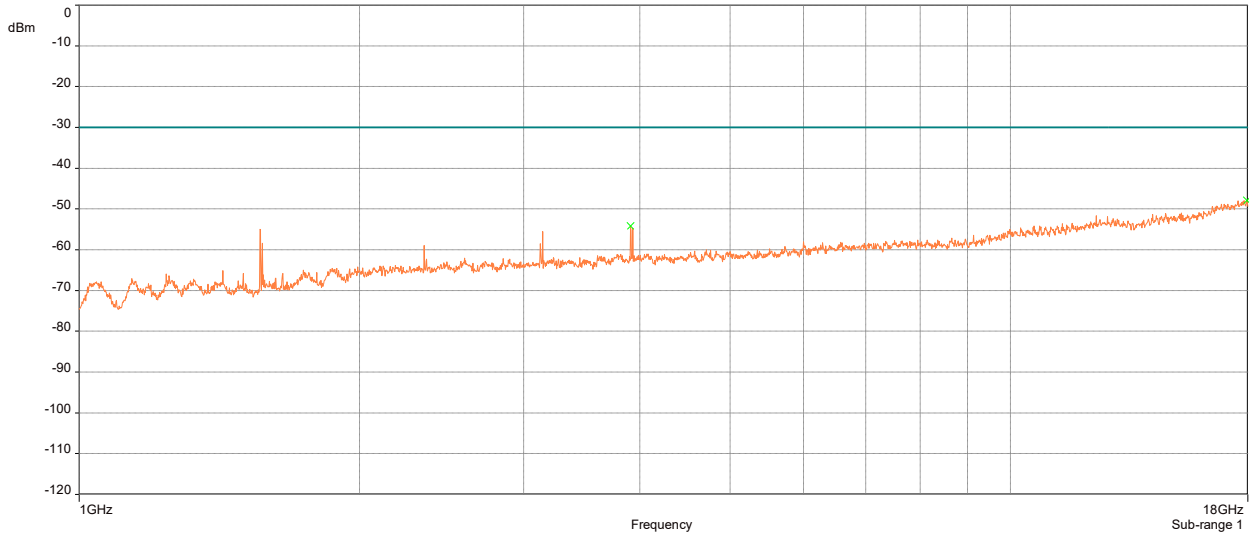


LTE Band 13 QPSK, RSE 1GHz-18GHz

782.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1564.0	-66.54	35.090	5.900	29.190	Vertical	-37.350	-13	24.350	-59.070
2346.0	-56.64	35.460	5.547	29.913	Vertical	-26.727	-13	13.727	-61.990
3128.0	-60.94	36.020	7.019	29.001	Vertical	-31.939	-13	18.939	-64.370
3910.0	-54.74	33.850	8.507	25.343	Vertical	-29.397	-13	16.397	-60.380
4692.0	-49.61	32.030	9.624	22.406	Vertical	-27.204	-13	14.204	-63.000
5474.0	-48.11	30.090	10.549	19.541	Vertical	-28.569	-13	15.569	-62.600
6256.0	-49.31	29.170	10.640	18.530	Vertical	-30.780	-13	17.780	-61.790
7038.0	-50.71	29.040	11.663	17.377	Vertical	-33.333	-13	20.333	-60.730
7820.0	-50.91	28.530	12.235	16.295	Vertical	-34.615	-13	21.615	-59.590

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 13 16QAM

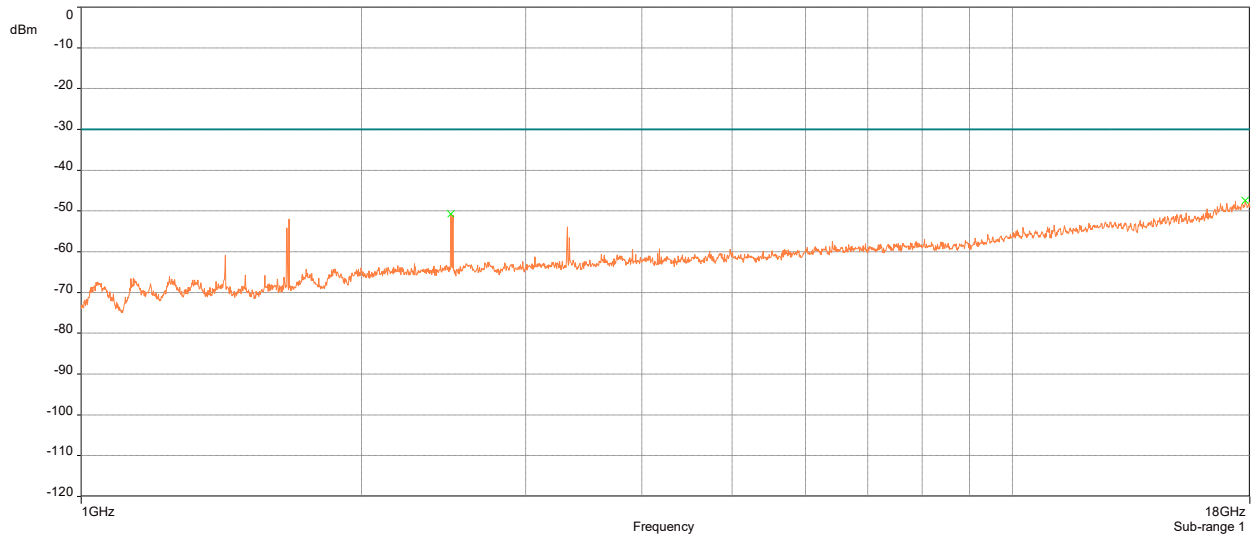


LTE Band 13 16QAM, RSE 1GHz-18GHz

782.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1564.0	-66.54	35.090	5.900	29.190	Vertical	-37.350	-13	24.350	-58.450
2346.0	-58.94	35.460	5.547	29.913	Vertical	-29.027	-13	16.027	-64.810
3128.0	-60.94	36.020	7.019	29.001	Vertical	-31.939	-13	18.939	-64.800
3910.0	-53.54	33.850	8.507	25.343	Vertical	-28.197	-13	15.197	-59.120
4692.0	-48.11	32.030	9.624	22.406	Vertical	-25.704	-13	12.704	-61.820
5474.0	-48.11	30.090	10.549	19.541	Vertical	-28.569	-13	15.569	-62.300
6256.0	-47.41	29.170	10.640	18.530	Vertical	-28.880	-13	15.880	-59.800
7038.0	-50.31	29.040	11.663	17.377	Vertical	-32.933	-13	19.933	-60.290
7820.0	-51.51	28.530	12.235	16.295	Vertical	-35.215	-13	22.215	-60.180

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 26 QPSK

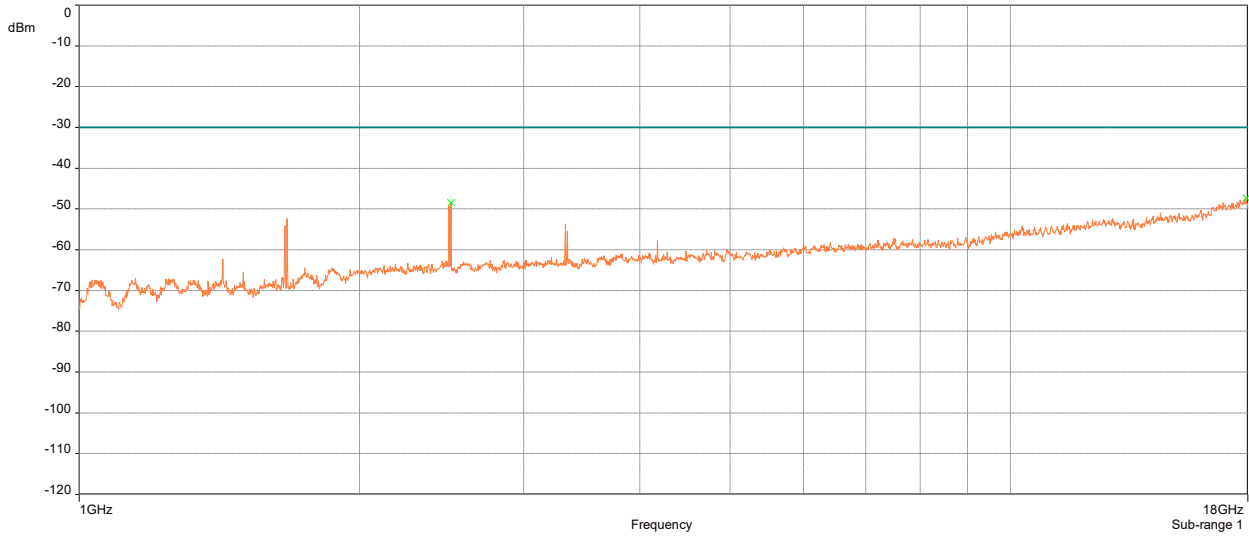


LTE Band 26 QPSK, RSE 1GHz-18GHz

831.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1663.0	-55.20	35.140	5.869	29.271	Vertical	-25.929	-13	12.929	-54.230
2494.5	-51.10	35.430	5.674	29.756	Vertical	-21.344	-13	8.344	-55.400
3326.0	-58.64	35.580	7.787	27.793	Vertical	-30.847	-13	17.847	-61.600
4157.5	-51.31	32.970	9.330	23.640	Vertical	-27.670	-13	14.670	-63.320
4989.0	-49.31	31.690	9.858	21.832	Vertical	-27.478	-13	14.478	-61.650
5820.5	-49.31	30.170	10.731	19.439	Vertical	-29.871	-13	16.871	-62.320
6652.0	-49.31	28.740	11.043	17.697	Vertical	-31.613	-13	18.613	-60.800
7483.5	-49.31	28.640	11.978	16.662	Vertical	-32.648	-13	19.648	-59.040
8315.0	-51.51	26.330	12.757	13.573	Vertical	-37.937	-13	24.937	-59.670

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 26 16QAM



LTE Band 26 16QAM, RSE 1GHz-18GHz

831.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1663.0	-55.90	35.140	5.869	29.271	Vertical	-26.629	-13	13.629	-55.520
2494.5	-51.10	35.430	5.674	29.756	Vertical	-21.344	-13	8.344	-55.550
3326.0	-60.84	35.580	7.787	27.793	Vertical	-33.047	-13	20.047	-64.430
4157.5	-52.31	32.970	9.330	23.640	Vertical	-28.670	-13	15.670	-64.210
4989.0	-49.31	31.690	9.858	21.832	Vertical	-27.478	-13	14.478	-61.970
5820.5	-49.31	30.170	10.731	19.439	Vertical	-29.871	-13	16.871	-62.430
6652.0	-49.31	28.740	11.043	17.697	Vertical	-31.613	-13	18.613	-60.690
7483.5	-49.31	28.640	11.978	16.662	Vertical	-32.648	-13	19.648	-59.500
8315.0	-51.51	26.330	12.757	13.573	Vertical	-37.937	-13	24.937	-60.200

Radiated Spurious Emissions, Harmonics using substitution method

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	07/13/2021	07/13/2022
1S2801	OTA Chamber 1	ETS Lindgren	AMS-8900	02/24/2020	02/24/2022
1S2848	System Amplifier Module	ETS Lindgren	SAM-5	SEE NOTE 1	
1S2843	EMCenter Switch	ETS Lindgren	3.4.7	SEE NOTE 1	
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.					

Test Equipment List

End of Report