

August 18, 2021

CalAmp Wireless Networks CA
2200 Faraday Ave #220
Carlsbad CA 92008

Dear Imad Rizk,

Enclosed is the EMC Wireless test report for compliance testing of the CalAmp Wireless Networks CA, SC1205V 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\WIRS113743-FCC22_24_27 Rev 1)



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Electromagnetic Compatibility Criteria Test Report

for the

**CalAmp Wireless Networks CA
SC1205V**

**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: WIR113743-FCC22_24_27 Rev 1

Prepared For:

**CalAmp Wireless Networks CA
2200 Faraday Ave #220
Carlsbad CA 92008**

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

Electromagnetic Compatibility Criteria Test Report

for the

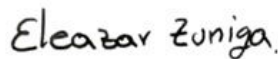
**CalAmp Wireless Networks CA
SC1205V**

**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
Ø	August 15, 2021	Initial Issue.
1	August 18, 2021	TCB Review Updates.

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I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the CalAmp Wireless Networks CA, SC1205V, 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 SC1205V. CalAmp Wireless Networks CA should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the SC1205V, 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 CalAmp Wireless Networks CA, purchase order number 404965. 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: XMR201707BG96
§2.1049, §22.355, §24.238;	Frequency stability	Data valid from module original certification of FCC ID: XMR201707BG96
§22.913(d), §24.323(d); §27.50;	Peak to Average Ratio	Data valid from module original certification of FCC ID: XMR201707BG96
§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: XMR201707BG96
§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 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 CalAmp Wireless Networks CA to perform testing on the SC1205V, under purchase order number 404965.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of CalAmp Wireless Networks CA, SC1205V.

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

Model(s) Tested:	SC1205V	
Model(s) Covered:	SC1205V	
Filing Status:	Original	
EUT Specifications:	Primary Power: Voltage: 12 V AC or DC: DC Voltage Frequency: NA Number of Phases: 1 Current: 0.5 Amp	
	Module Original Report Number(s): Report: RXA1706-0199RF01R1 Report: RXA1706-0199RF02R1 Report: RXA1706-0199RF03R1	
	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 18, 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 C63.4:2014	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 v03r01	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:	SC1205V
Description of EUT and its intended use:	The EUT is an asset tracker.
Selected Operation Mode(s):	The EUT cellular radio is paired with a call box CMW500 to exercise the radio.
Rationale for the selection of the Operation Mode(s):	The cellular radio requires a base station to establish a radio connection.
Monitoring Method(s):	The display screen on the CMW500 shows the radio connection with info like frequency band, modulation, power etc.
Emissions Class Declaration:	Class A
Configuration(s):	NA
EUT Power Requirement	
Voltage:	12 VDC (Vehicle battery powered)
AC or DC:	DC
Voltage Frequency:	NA
Number of Phases:	NA
Current:	0.5 A
Physical Description	
EUT Arrangement:	Table Top
System with Multiple Chassis?	NA
Size (HxWxD - inches):	30mm x 80mm x 140mm
Weight (lbs):	0.5 lbs
Other Info	
EUT Software (internal to EUT):	Rev 1
Support Software (used by support PC to exercise EUT):	NA
Firmware:	Rev 1
Transmitter Parameters	
Description of your unit:	Cellular
Modulation Type:	QPSK, 16QAM
Number of Channels:	NA
Frequency range (MHz):	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
Antenna Type:	Cellular: SMD (Model Antenova SR4L002)
Antenna Gain (dbi):	Cellular: 689 - 798 MHz (0.5 dBi) 824 - 960 MHz (1.0 dBi) 1710 - 2170 MHz (2.5 dBi) 2300 - 2400 MHz (1.6 dBi) 2500 - 2690 MHz (2.5 dBi)
PMN:	NA
HVIN:	NA
FVIN:	NA
HMN:	NA
Data Rates:	NA
Expected Power Level:	Cellular: 23 dBm (Conducted)
Number of Antenna:	Cellular: 2
Number of Intentional Transmitters:	Cellular: 2
Number of Certified Intentional Transmitter Modules:	Cellular: 1

EUT List

Ref.ID	Slot#	Name/Description	Model Number	Part Number	Serial Number	Rev. #
EU01	1	DUT1	SC1205V	--	--	--

*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 CalAmp Wireless Networks CA 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.

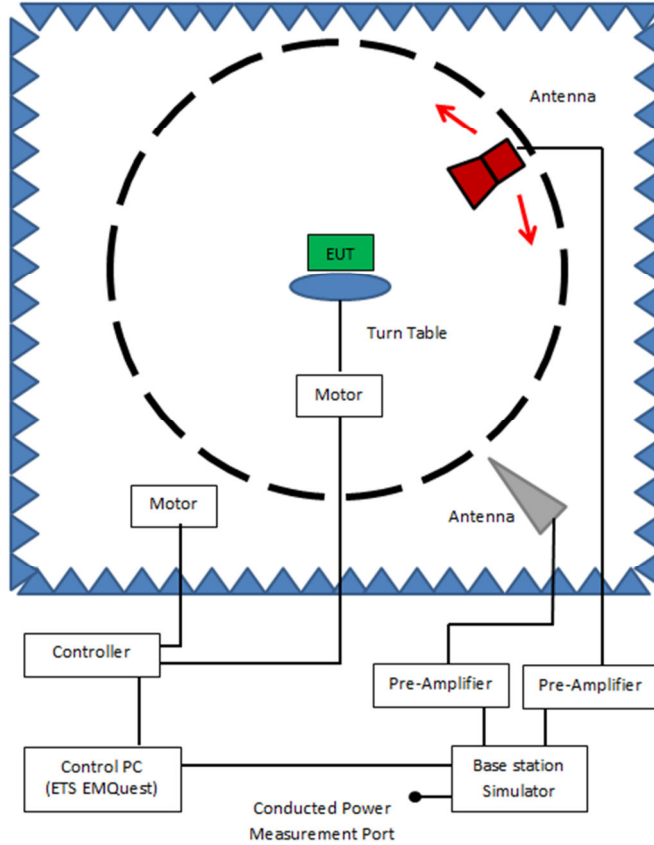
§27.50 (d)(4): Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height 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): 07/22/2021



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	27.16	25.01	38.45	Pass

GSM 1900

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
1880	29.37	NA	33.00	Pass

LTE CAT M1 Band 2

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
1880	25.37	NA	33.00	Pass

LTE CAT M1 Band 4

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
1732.5	26.25	NA	30.00	Pass

LTE CAT M1 Band 5

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
836.5	23.70	21.55	38.45	Pass

LTE CAT M1 Band 12

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
707.5	23.38	21.23	34.77	Pass

LTE CAT M1 Band 13

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
782	24.79	22.64	34.77	Pass

LTE CAT M1 Band 26

Frequency (MHz)	Measured EIRP (dBm)	Calculated ERP (dBm)	Limit (dBm)	Result
836.5	24.32	22.17	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:

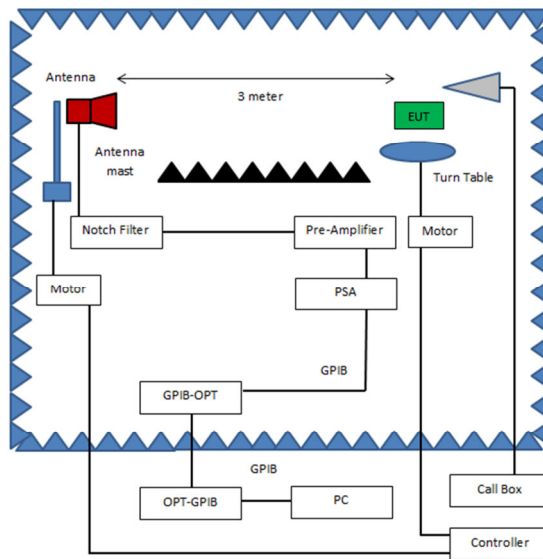
The EUT was tested according to the average power integration procedures of ANSI C63.26 (2015) 5.5.3.

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.

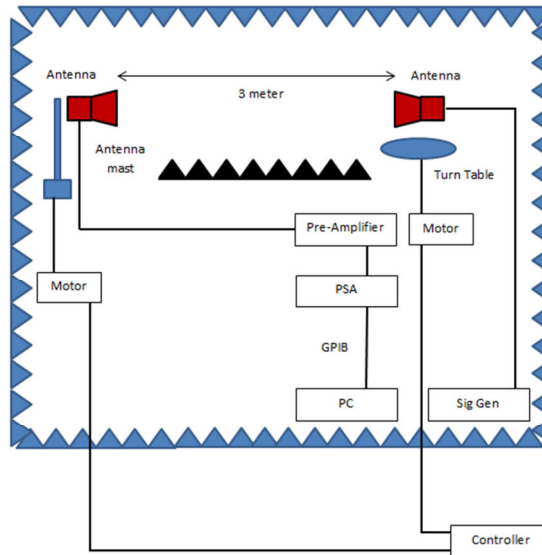
A step-by-step procedure is as follows.

- 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.

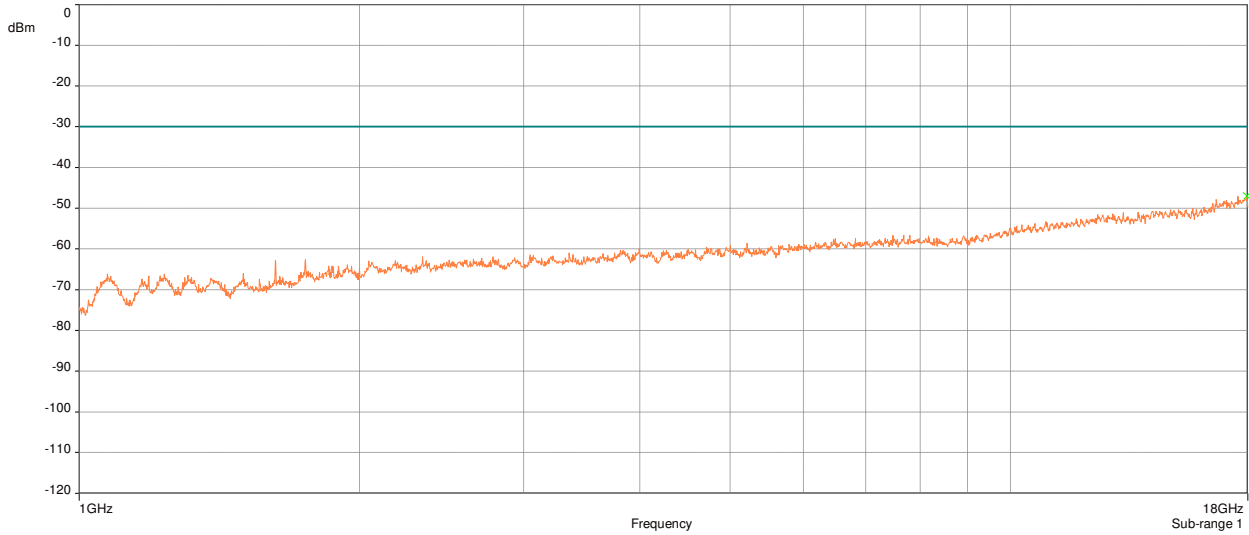
Measurements were made in each configuration. Data is presented for the worse case configuration.

Test Engineer: Nate Park

Test Date(s): 07/16/2021

Radiated Spurious Emissions

GSM 850

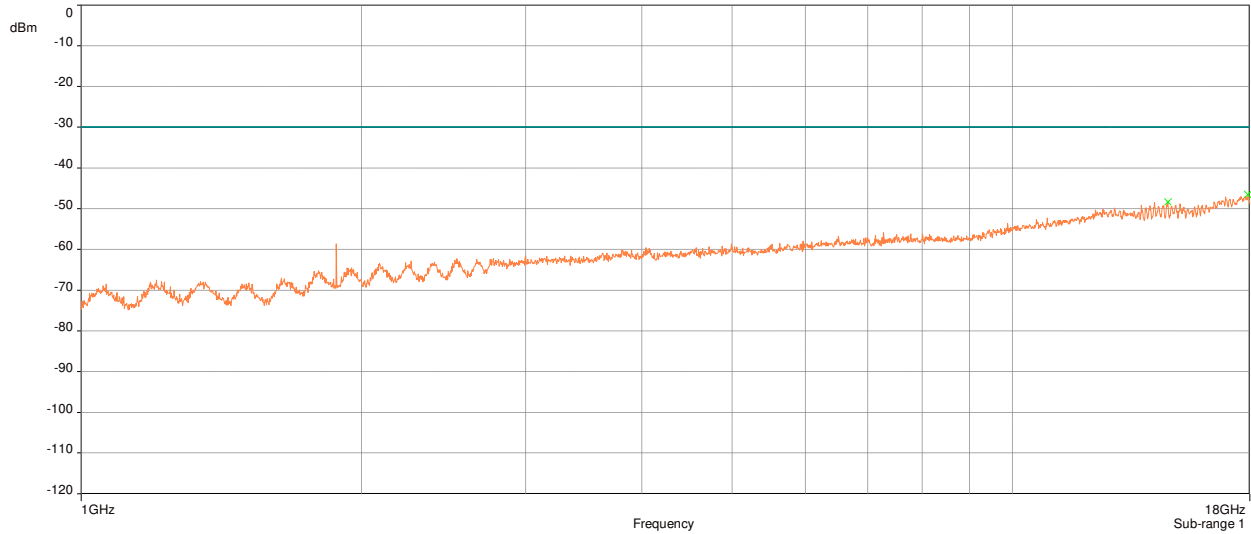


GSM 850, RSE 1GHz-18GHz

831.6	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1663.2	-69.50	36.570	5.869	30.701	Vertical	-38.799	-13	25.799	-68.960
2494.8	-62.80	37.530	5.674	31.856	Vertical	-30.944	-13	17.944	-64.065
3326.4	-62.70	37.940	7.787	30.153	Vertical	-32.547	-13	19.547	-63.907
4158.0	-59.80	35.220	9.330	25.890	Vertical	-33.910	-13	20.910	-63.923
4989.6	-54.40	33.760	9.858	23.902	Vertical	-30.498	-13	17.498	-61.434
5821.2	-51.20	32.490	10.731	21.759	Vertical	-29.441	-13	16.441	-60.913
6652.8	-56.00	31.400	11.043	20.357	Vertical	-35.643	-13	22.643	-61.249
7484.4	-55.90	30.090	11.978	18.112	Vertical	-37.788	-13	24.788	-59.270
8316.0	-57.40	28.910	12.757	16.153	Vertical	-41.247	-13	28.247	-60.280

Radiated Spurious Emissions, Harmonics using substitution method

GSM 1900

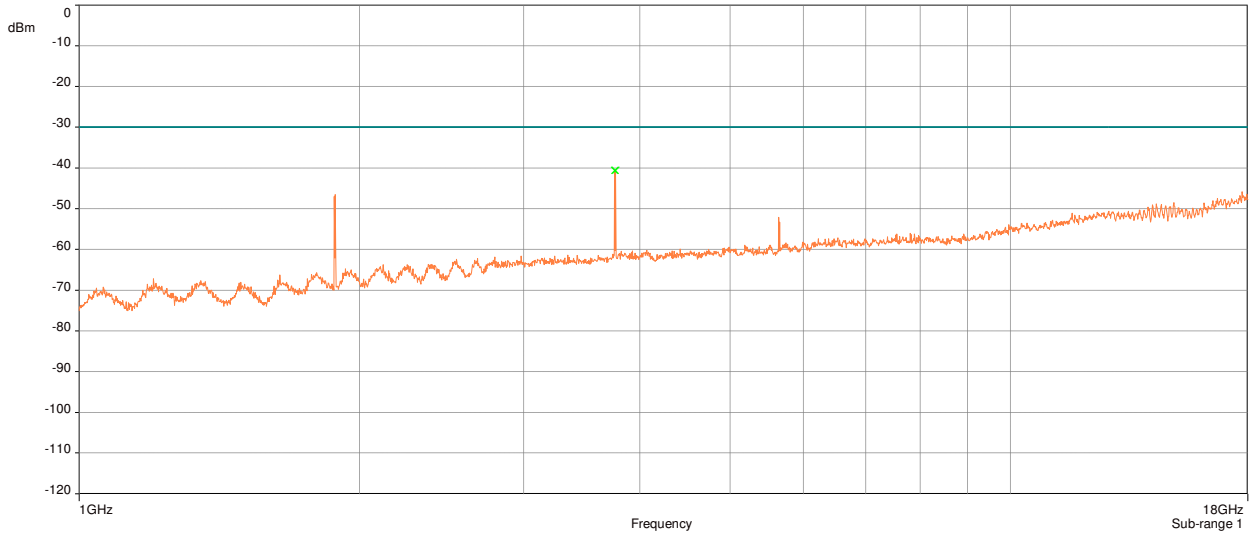


GSM 1900, RSE 1GHz-18GHz

1880.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3760.0	-59.90	36.690	8.222	28.468	Vertical	-31.432	-13	18.432	-63.039
5640.0	-52.30	32.810	10.555	22.255	Vertical	-30.045	-13	17.045	-61.493
7520.0	-55.30	30.460	12.099	18.361	Vertical	-36.939	-13	23.939	-58.820
9400.0	-54.00	28.370	13.455	14.915	Vertical	-39.085	-13	26.085	-57.611
11280.0	-48.00	27.620	13.254	14.366	Vertical	-33.634	-13	20.634	-53.582
13160.0	-46.80	28.770	13.299	15.471	Vertical	-31.329	-13	18.329	-52.551
15040.0	-43.00	27.140	13.915	13.225	Vertical	-29.775	-13	16.775	-51.874
16920.0	-36.30	25.390	12.566	12.824	Vertical	-23.476	-13	10.476	-51.127
18800.0	X	X	X	X	X	X	X	X	X

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 2

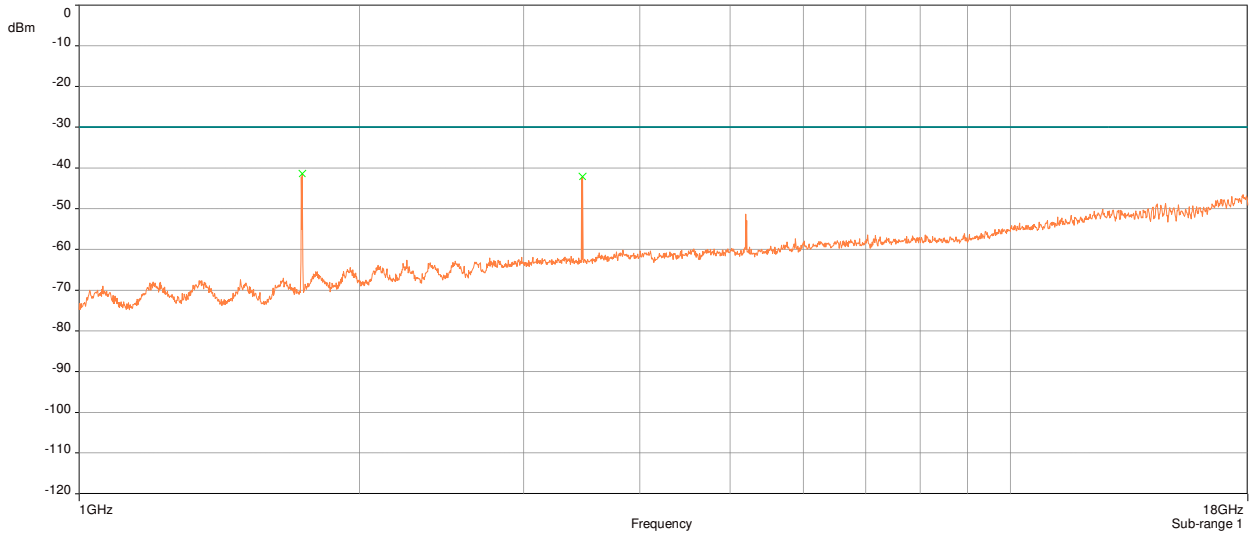


LTE Band 2 QPSK, RSE 1GHz-18GHz

1880.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3760.0	-44.64	36.690	8.222	28.468	Vertical	-16.172	-13	3.172	-40.586
5640.0	-45.50	32.810	10.555	22.255	Vertical	-23.245	-13	10.245	-52.159
7520.0	-56.50	30.460	12.099	18.361	Vertical	-38.139	-13	25.139	-59.269
9400.0	-54.70	28.370	13.455	14.915	Vertical	-39.785	-13	26.785	-57.800
11280.0	-49.90	27.620	13.254	14.366	Vertical	-35.534	-13	22.534	-55.689
13160.0	-46.90	28.770	13.299	15.471	Vertical	-31.429	-13	18.429	-53.039
15040.0	-42.70	27.140	13.915	13.225	Vertical	-29.475	-13	16.475	-52.826
16920.0	-33.90	25.390	12.566	12.824	Vertical	-21.076	-13	8.076	-49.338
18800.0	x	x	x	x	x	x	x	x	x

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 4

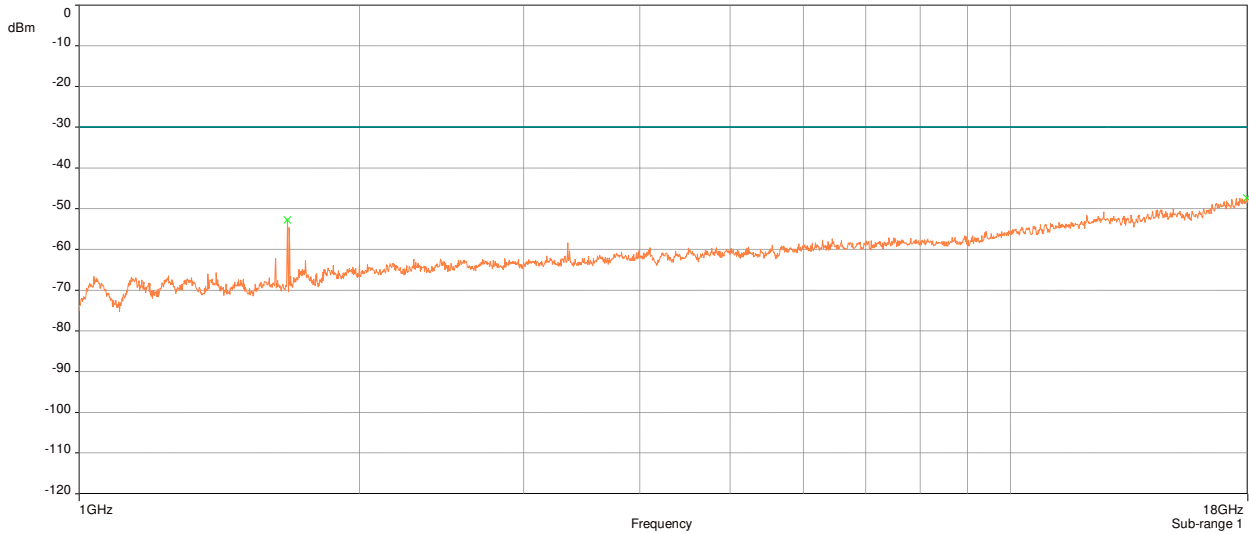


LTE Band 4 QPSK, RSE 1GHz-18GHz

1732.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3465.0	-45.76	37.570	8.544	29.026	Vertical	-16.734	-13	3.734	-42.467
5197.5	-42.80	32.900	10.253	22.647	Vertical	-20.153	-13	7.153	-51.371
6930.0	-53.40	30.580	11.451	19.129	Vertical	-34.271	-13	21.271	-58.867
8662.5	-55.10	29.170	13.046	16.124	Vertical	-38.976	-13	25.976	-58.662
10395.0	-49.90	27.350	13.081	14.269	Vertical	-35.631	-13	22.631	-55.108
12127.5	-47.60	28.360	13.063	15.297	Vertical	-32.303	-13	19.303	-53.103
13860.0	-49.00	27.510	14.385	13.125	Vertical	-35.875	-13	22.875	-54.666
15592.5	-42.40	26.130	13.470	12.660	Vertical	-29.740	-13	16.740	-52.220
17325.0	-36.90	24.960	13.143	11.817	Vertical	-25.083	-13	12.083	-50.015

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 5

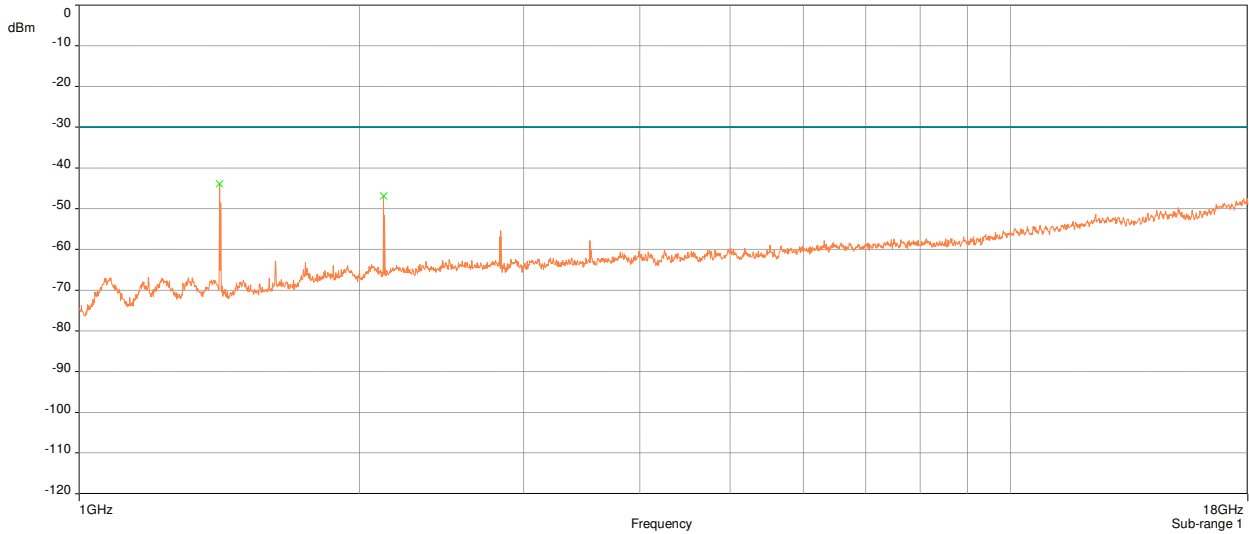


LTE Band 5 QPSK, RSE 1GHz-18GHz

836.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1673.0	-53.70	36.640	5.692	30.948	Vertical	-22.752	-13	9.752	-52.828
2509.5	-61.10	37.580	5.673	31.907	Vertical	-29.193	-13	16.193	-63.448
3346.0	-56.00	37.950	7.787	30.163	Vertical	-25.837	-13	12.837	-58.379
4182.5	-58.30	35.540	9.330	26.210	Vertical	-32.090	-13	19.090	-64.405
5019.0	-53.60	32.920	9.894	23.026	Vertical	-30.574	-13	17.574	-61.452
5855.5	-53.60	32.050	10.688	21.362	Vertical	-32.238	-13	19.238	-61.114
6692.0	-55.70	31.240	11.043	20.197	Vertical	-35.503	-13	22.503	-59.857
7528.5	-54.40	30.220	12.099	18.121	Vertical	-36.279	-13	23.279	-57.400
8365.0	-56.20	30.020	12.820	17.200	Vertical	-39.000	-13	26.000	-59.296

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 12

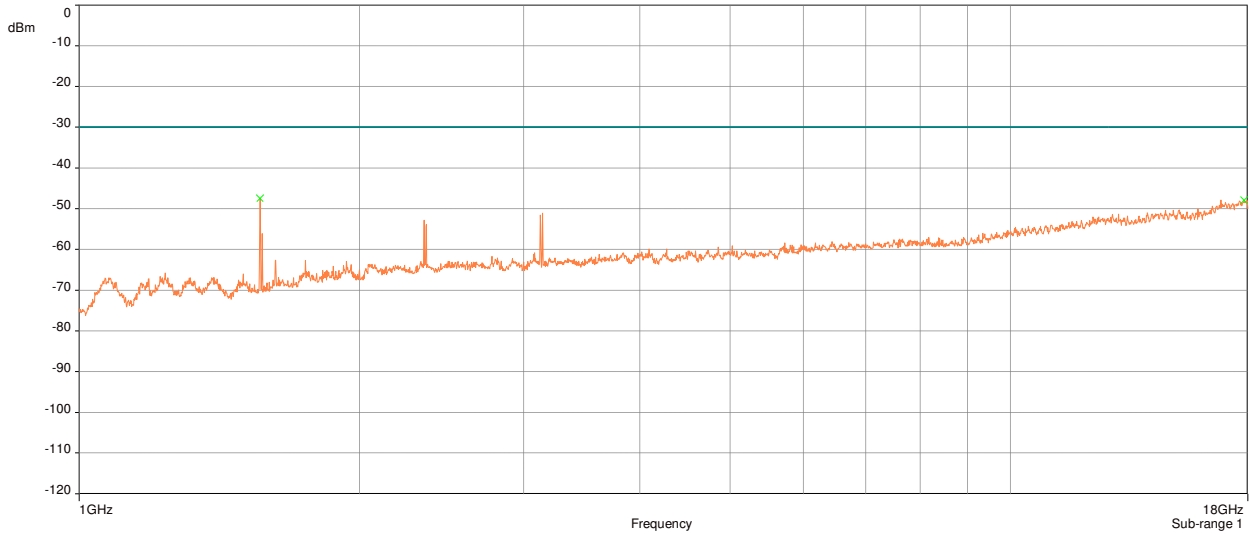


LTE Band 12 QPSK, RSE 1GHz-18GHz

707.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1415.0	-47.98	36.520	4.721	31.799	Vertical	-16.181	-13	3.181	-43.906
2122.5	-50.43	36.910	5.066	31.844	Vertical	-18.586	-13	5.586	-46.891
2830.0	-56.10	37.740	7.104	30.636	Vertical	-25.464	-13	12.464	-56.891
3537.5	-56.30	37.530	8.161	29.369	Vertical	-26.931	-13	13.931	-57.775
4245.0	-56.80	35.120	9.491	25.629	Vertical	-31.171	-13	18.171	-61.279
4952.5	-53.90	33.250	9.858	23.392	Vertical	-30.508	-13	17.508	-61.903
5660.0	-52.20	32.500	10.634	21.866	Vertical	-30.334	-13	17.334	-60.969
6367.5	-54.90	31.140	10.760	20.380	Vertical	-34.520	-13	21.520	-61.197
7075.0	-55.80	30.690	11.741	18.949	Vertical	-36.851	-13	23.851	-60.966

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 13

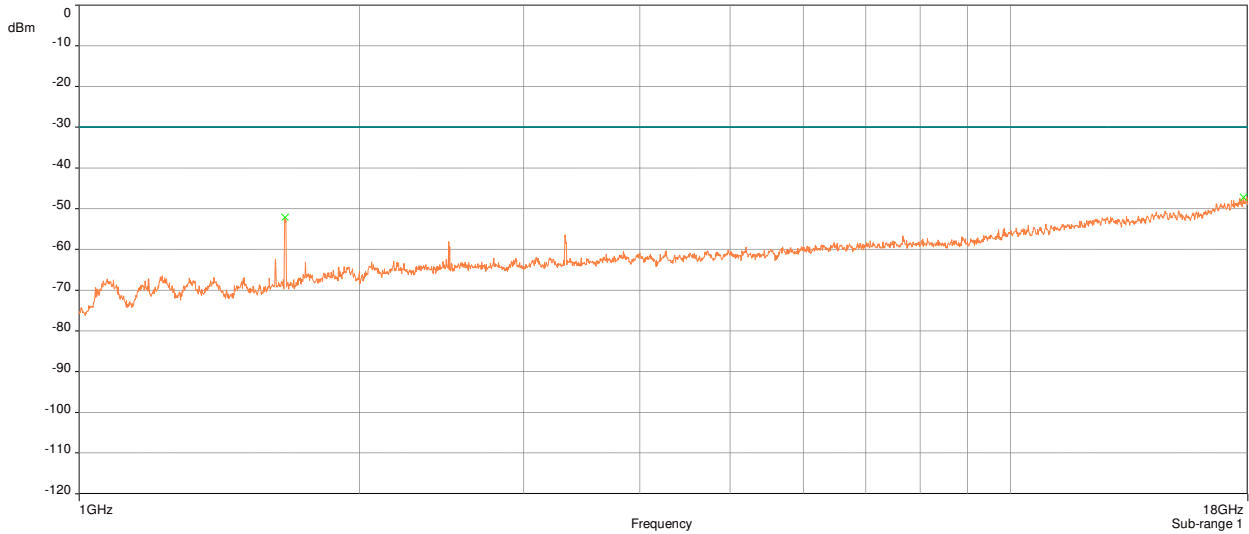


LTE Band 13 QPSK, RSE 1GHz-18GHz

782.0	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
1564.0	-51.10	36.610	5.900	30.710	Vertical	-20.390	-13	7.390	-47.483
2346.0	-50.00	37.270	5.547	31.723	Vertical	-18.277	-13	5.277	-53.331
3128.0	-49.80	37.960	7.019	30.941	Vertical	-18.859	-13	5.859	-51.492
3910.0	-58.80	36.250	8.507	27.743	Vertical	-31.057	-13	18.057	-63.576
4692.0	-54.00	34.410	9.624	24.786	Vertical	-29.214	-13	16.214	-61.821
5474.0	-53.20	32.400	10.549	21.851	Vertical	-31.349	-13	18.349	-62.173
6256.0	-52.90	31.170	10.640	20.530	Vertical	-32.370	-13	19.370	-61.023
7038.0	-55.70	30.720	11.663	19.057	Vertical	-36.643	-13	23.643	-60.302
7820.0	-56.50	30.380	12.235	18.145	Vertical	-38.355	-13	25.355	-59.358

Radiated Spurious Emissions, Harmonics using substitution method

LTE Band 26



LTE Band 26 QPSK, RSE 1GHz-18GHz

1882.5	SG	SL	AG	SL-AG	Ant Pol	EIRP	Limit	Margin	Target SA
3765.0	-60.20	36.630	8.222	28.408	Vertical	-31.792	-13	18.792	-63.222
5647.5	-53.50	32.550	10.555	21.995	Vertical	-31.505	-13	18.505	-62.444
7530.0	-56.00	31.180	12.099	19.081	Vertical	-36.919	-13	23.919	-59.602
9412.5	-55.00	29.420	13.455	15.965	Vertical	-39.035	-13	26.035	-58.591
11295.0	-51.10	28.220	13.254	14.966	Vertical	-36.134	-13	23.134	-56.956
13177.5	-49.80	28.350	13.299	15.051	Vertical	-34.749	-13	21.749	-55.195
15060.0	-44.40	25.730	13.923	11.807	Vertical	-32.593	-13	19.593	-52.995
16942.5	-37.10	25.210	12.566	12.644	Vertical	-24.456	-13	11.456	-51.224
18825.0	X	X	X	X	X	X	X	X	X

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 Amplifire Module	ETS Lindgren	SAM-5	SEE NOTE 1	
1S2843	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