FCC PART 15, SUBPART B
ICES-003, ISSUE 6 (JAN. 2016)

CLASS A TEST REPORT

For

SeaTel Inc.

4030 Nelson Avenue,

Concord, CA 94520, USA

FCC ID: 2ADHY-TRACKER-300W

Report Type: Original Report	**Product Type:** C-Band Satellite Antenna Tracker

Steven Lianto

Prepared By: Test Engineer

Report Number: R2007082

Report Date: 2020-10-15

Shoaib Khan

Reviewed By: EMC Lead

Bay Area Compliance Laboratories Corp.
1274 Anvilwood Ave
Sunnyvale, CA 94089, USA
Tel: +1 (408) 732-9162, Fax: +1 (408) 732 9164

ACCREDITED
CERTIFICATE #3297.02

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Bay Area Compliance Laboratories Corp.
1274 Anvilwood Ave., Sunnyvale, CA 94089, USA
Phone: (408) 732-9162, Fax: (408) 732-9164
www.baclcorp.com

ATTESTATION OF TEST RESULTS

Date of Issue: 2020-10-15 Attestation Number: R2007082

Bay Area Compliance Laboratories Corp. (BACL) hereby declares that testing has been completed and is compliant for the product and standards below:

Product Name / Description:	C-Band Satellite Antenna Tracker
Model:	T6000
Manufactured by:	SeaTel Inc.
Project Number:	R2007082

Standard	**Test Result**
FCC PART 15 SUBPART B ICES-003 ISSUE 6 (Jan. 2016)	Pass

BACL tested the above equipment in accordance with the requirement with the above Standards. The results were being documented in Test Report #R2007082 listed in above table apply only to the tested sample under the condition and modes of operation as described herein.

Attestation by: Shoaib Khan
EMC Lead

Signature

2020-10-15
Date

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2007082	Original Report	2020-10-15

1 General Information

1.1 General Statements

Bay Area Compliance Laboratory Corp. [BACL] hereby makes the following Statements:

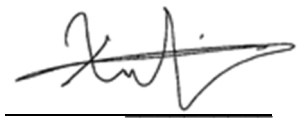
- The Unit(s) described in this Test Report were received at BACL's facilities on 13 July 2020. Testing was performed on the Unit(s) described in this Test Report during the period 13 through 14 July 2020.
- The Test Results reported herein apply only to the Unit(s) actually tested, and to substantially identical Units.
- This Test Report must not be used to claim product endorsement by A2LA, or any agency of the U.S. Government, or by any other foreign government.
- This Test Report is the property of BACL, and shall not be reproduced, except in full, without prior written approval of BACL.

1.2 Purpose

This report was prepared on behalf of *SeaTel Inc.* and their product *C-Band Satellite Antenna Tracker*, Model: *T6000, FCC ID: 2ADHY-TRACKER-300W,* in accordance with FCC Part 15B, Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurements, Issue 6 of Innovation, Science, and Economic Development Canada ICES-003, Interference – Causing Equipment Standards for Digital Apparatus.

THE DATA CONTAINED IN THIS TEST REPORT WAS COLLECTED AND COMPILED BY:

Steven Lianto
[Test Engineer]



Xinhao Jiang
[Test Engineer]

1.3 Agent for the Responsible Party

None

1.4 Responsible Party

Company Name:	SeaTel Inc.
Contact:	Kevin Barry
Street Address:	4030 Nelson Avenue
City/State/Zip:	Concord, CA 94520
Country:	USA
Telephone:	+1 (925) 798-7979 Ext. 318
Fax:	+1 (925) 798-7986
Email:	kevin.barry@cobham.com

1.5 Product Description of the Equipment under Test (EUT)

The "EUT" (Equipment under Test) was a C-Band Satellite Antenna Tracker. The highest frequency used and/or generated was 5249.12 MHz.

1.6 Mechanical Description of the EUT

Dimensions: approximately 800 cm (H) x 800 cm (W) x 745 cm (H)
Weight: approximately 1366 kg
Serial Number: None
EUT Photos: See Annex A of this Test Report.

1.7 EUT Input Power

The EUT was powered by 240 VAC, 60 Hz single phase power supply.

1.8 Related Submittal(s)/Grant(s)

No related submittals.

1.9 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0308.

1.10 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02)*****,** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)*** to certify

- For the USA (Federal Communications Commission):
    1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
    2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
    3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
    1 All Scope 1-Licence-Exempt Radio Frequency Devices;
    2 All Scope 2-Licensed Personal Mobile Radio Services;
    3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
    4 All Scope 4-Licensed Maritime & Aviation Radio Services;
    5 All Scope 5-Licensed Fixed Microwave Radio Services
    6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):

1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2

2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2

- For the Hong Kong Special Administrative Region:

1 All Radio Equipment, per KHCA 10XX-series Specifications;

2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;

3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.

- For Japan:

1 MIC Telecommunication Business Law (Terminal Equipment):

- All Scope A1 - Terminal Equipment for the Purpose of Calls;
- All Scope A2 - Other Terminal Equipment

2 Radio Law (Radio Equipment):

- All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
- All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
- All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;

- Canada: (Industry Canada - IC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
    - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
    - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
    - EMC Directive 2004/108/EC US-EU EMC & Telecom MRA CAB
    - EMC Directive 2014/30/EU MRA NB
    - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC US -EU EMC & Telecom MRA CAB
    - Radio Equipment (RE) Directive 2014/53/EU MRA NB
    - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Development Authority - IDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
    - ENERGY STAR Recognized Test Laboratory – US EPA
    - Telecommunications Certification Body (TCB) – US FCC;
    - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

1.11 Measurement Uncertainties

All measurements involve uncertainties. In the case of EMC Emissions tests, the influence quantities (factors) that make a significant contribution to the measurement uncertainties for most types of Emissions measurements are detailed in the latest version of CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Measurement instrumentation uncertainty" (i.e., in CISPR 16-4-2:2011-06 + C1:2013-04 +A1:2014-02).

Based on the uncertainty models given in the latest version of CISPR16-4-2, and, based on the calibration uncertainties of the specific instruments and facilities used at BACL to perform the measurements documented in this Test Report, the following estimates have been made of BACL's Measurement Uncertainties for the measurements documented in this Test Report.

(Note: the phrase "Typical U_{LAB} values" means that the U_{LAB} values presented are the Expanded Measurement Uncertainty values that resulted from the use of the ordinary test processes that are employed on a daily basis in our Test Laboratory. Note that he smaller the value of Expanded Measurement Uncertainty, the better (i.e., the "less uncertain") the measurement is.

Type of Measurement: **ANSI C63.4-2014 Conducted Emissions (on the BACL Ground Plane Test Site)** **Note: Measurements made using a n R&S ESCI EMI Receiver**	**BACL Typical U_{LAB} Value** **(for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**	**U_{CISPR} Value** **worst-allowable values of the latest version of CISPR 16-4-2** **(for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**
Conducted Disturbance (Mains Port) 9 kHz to 150 MHz (i.e., AC/DC Line Conducted Emissions measurements made using the Narda PMM L3-100 4-Line LISN)	**3.05 dB**	**3.83 dB**
Conducted Disturbance (Mains Port) 150 kHz to 30 MHz (i.e., AC/DC Line Conducted Emissions measurements made using the Narda PMM L3-100 4-Line LISN)	**3.05 dB**	**3.44 dB**
Conducted Disturbance (Mains Port) 150 kHz to 30 MHz (i.e., AC/DC Line Conducted Emissions measurements made with a Fischer FCC-LISN-50-25-2-10 LISN)	**2.26 dB**	**3.44 dB**
Conducted Disturbance (Mains Port) 9 kHz to 30 MHz (i.e., AC/DC Line Conducted Emissions measurements made with an ETS-Lindgren Model 3701 Line Voltage Probe)	**1.04 dB**	**2.91 dB**

Type of Measurement: **ANSI C63.4-2014 Radiated Emissions (in the BACL 10 m - 1 SAC)** **Note: Measurements up to 1 GHz made using an R&S ESCI EMI Receiver; Measurements from 1 GHz to 40 GHz made using an R&S ESU40 EMI Receiver**	**BACL Typical U_{LAB} Value** **(for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**	**U_{CISPR} Value** **worst-allowable values of the latest version of CISPR 16-4-2 (for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**
Radiated Magnetic Field Disturbance – 9 kHz to 30 MHz (i.e., Radiated H-Field levels measured using a Single-axis Active Loop Antenna at a fixed height at either 3 or 10 metres distance)	**1.64 dB**	**U_{CISPR} Value is Not Specified**
Radiated Electric Field Disturbance – Horizontal Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**3.25 dB (No Tilting)**	**5.06 dB (No Tilting)**
Radiated Electric Field Disturbance – Vertical Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions at 3 metres distance)	**3.87 dB (No Tilting)**	**5.17 dB (No Tilting)**
Radiated Electric Field Disturbance – Horizontal Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions measured at 10 metres distance)	**4.21 dB**	**5.05 dB**
Radiated Electric Field Disturbance – Vertical Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions measured at 10 metres distance)	**4.07 dB**	**5.03 dB**
Radiated Electric Field Disturbance – Horizontal Polarization, 200 MHz – 1000 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.60 dB (No Tilting)**	**5.34 dB (No Tilting)**
Radiated Electric Field Disturbance – Vertical Polarization, 200 MHz – 1000 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**5.51 dB (No Tilting)**	**6.32 dB (No Tilting)**
Radiated Electric Field Disturbance – Horizontal Polarization, 200 MHz – 1000 MHz (i.e., Radiated Emissions at 10 metres distance)	**4.17 dB**	**5.21 dB**
Radiated Electric Field Disturbance – Vertical Polarization, 200 MHz – 1000 MHz z (i.e., Radiated Emissions measured at 10 metres distance)	**4.46 dB**	**5.22 dB**
Radiated Electric Field Disturbance Horizontal & Vertical Polarizations, 1 GHz – 6 GHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.62 dB (With Boresighting)**	**U_{CISPR} Value is Not Specified**
Radiated Electric Field Disturbance Horizontal & Vertical Polarizations, 1 GHz – 6 GHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.67 dB (With Boresighting)**	**U_{CISPR} Value is Not Specified**
Radiated Electric Field Disturbance Horizontal & Vertical Polarizations, 18 GHz – 26.5 GHz (i.e., Radiated Emissions measured at 1 metres distance)	**4.81 dB (With Boresighting)**	**U_{CISPR} Value is Not Specified**
Radiated Electric Field Disturbance Horizontal & Vertical Polarizations, 26.5 GHz – 40 GHz (i.e., Radiated Emissions at 1 metres distance)	**5.00 dB (With Boresighting)**	**U_{CISPR} Value is Not Specified**

Type of Measurement: **CISPR-type Radiated Emissions (in the BACL 10 m - 1 SAC)** **Note: Measurements up to 1 GHz made using an R&S ESCI EMI Receiver; Measurements from 1 GHz to 40 GHz made using an R&S ESU40 EMI Receiver**	**BACL Typical U_{LAB} Value** **(for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**	**U_{CISPR} Value** **worst-allowable values of the latest version of CISPR 16-4-2** **(for a k=2 Coverage Factor, equivalent to ~ 95% level of confidence)**
Radiated Magnetic Field Disturbance – 9 kHz to 30 MHz (i.e., Radiated H-Field levels measured using a Single-axis Active Loop Antenna at a fixed height at either 3 or 10 metres distance)	**1.64 dB**	**U_{CISPR} Value is Not Specified**
Radiated Magnetic Disturbance – 9 kHz to 30 MHz (i.e., induced Current levels measured using a 2 m diameter 3-Axis Van Veen Loop Antenna System)	**1.29 dB**	**3.30 dB *** ***Note: proposed value.**
Radiated Electric Field Disturbance – Horizontal Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**3.25 dB (No Tilting)**	**5.06 dB (No Tilting)**
Radiated Electric Field Disturbance – Vertical Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions at 3 metres distance)	**3.87 dB (No Tilting)**	**5.17 dB (No Tilting)**
Radiated Electric Field Disturbance – Horizontal Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions measured at 10 metres distance)	**4.21 dB**	**5.05 dB**
Radiated Electric Field Disturbance – Vertical Polarization, 30 MHz – 200 MHz (i.e., Radiated Emissions measured at 10 metres distance)	**4.07 dB**	**5.03 dB**
Radiated Electric Field Disturbance – Horizontal Polarization, 200 MHz – 1000 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.60 dB (No Tilting)**	**5.34 dB (No Tilting)**
Radiated Electric Field Disturbance – Vertical Polarization, 200 MHz – 1000 MHz (i.e., Radiated Emissions measured at 3 metres distance)	**5.51 dB (No Tilting)**	**6.32 dB (No Tilting)**
Radiated Electric Field Disturbance – Horizontal Polarization, 200 MHz – 1000 MHz (i.e., Radiated Emissions at 10 metres distance)	**4.17 dB**	**5.21 dB**
Radiated Electric Field Disturbance – Vertical Polarization, 200 MHz – 1000 MHz z (i.e., Radiated Emissions measured at 10 metres distance)	**4.46 dB**	**5.22 dB**
Radiated Electric Field Disturbance Horizontal & Vertical Polarizations, 1 GHz – 6 GHz (i.e., Radiated Emissions measured at 3 metres distance)	**4.94 dB (No Tilting)**	**5.18 dB (No Tilting)**

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing in accordance with requirements of the ANSI C63.4-2014 standard.

2.2 EUT Exercise Software

The exercising software was pre-installed by the customer.

2.3 BACL EMI Measurement Software

The software used was EMISoft-Vasona 6.0 for EMI testing.

2.4 Equipment Modifications

No modifications were made to the equipment.

2.5 Special Equipment

No special equipment used during testing.

2.6 EUT Mode of Operation

The EUT was tested on static mode. Once powered, the EUT would initialized to full motion on three axis, azimuth, elevation, and cross level. After it finished calibrate itself, the EUT could be controlled using the exercising software.

2.7 Method of Monitoring

The EUT was working as intended as long as it maintained its position (monitored from the exercising software) and its power in both of the IBUC R (monitored using a web browser) during the test.

2.8 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Toshiba	Monitoring Laptop	Satellite A665-S6093	XA491776K
HP	Signal Generator	8648C	3847M00143

2.9 Remote Support Equipment

None

2.10 EUT Internal Configuration Details

Manufacturer	Description	Model	Serial Number
SeaTel	Antenna 6m, C-Band, Feed Assy	T6000	-
SeaTel	Antenna Control Module	ICU3, A01	-
SeaTel	Power Monitor Assy	Power Monitor Assy, A01	-
SeaTel	Motor Driver Assy	FDM, A01	-
SeaTel	IFL and 10MHz Distribution	IFL10M, A01	-
Blue Sea Systems	Circuit Breaker Fuse	7260	-
Terrasat	IBUC R C-band 300W	IBR050052	-

2.11 EUT External I/O Cabling List and Details

Cable Description	Length (m)	From	To
SMA Cable	<1	EUT (TXIF RHCP)	EUT (TXIF LHCP)
SMA Cable	5	EUT (TXIF LHCP)	Signal Generator
Power Cable	5-10	EUT (Antenna Pedestal)	AC Power Supply
Ethernet Cable	10	EUT (Antenna Pedestal)	Monitoring Laptop

2.12 EUT Power Equipment List and Details

Manufacturer	Description	Model	Serial Number
XP Power	100-240AC to DC 48V	SHP650PS48-EF	-

3 Summary of Test Results

Standards	Test Description	Result
FCC §15.107 (b), ICES-003 Section 6.1 Table 1	Conducted Emissions	Compliant with Class A Limits
FCC §15.109 (b), ICES-003 Section 6.2 Table 4 and 6	Radiated Emissions	Compliant with Class A Limits

4 FCC §15.107, ICES-003 - Conducted Emissions

4.1 Applicable Standard

As per FCC §15.107: Conducted Emission Limits

(b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50µH/50 ohms LISN. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range MHz	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60
NOTE: *The lower limit shall apply at the transition frequency.*		

As per ISED ICES-003: Conducted Emission Limits

ITE that meets the conditions for Class A operation defined in Section 2.2 (of ICES-003 Issue 6 January 2016) shall comply with the Class A conducted limits set out below in Table 1.

Frequency range MHz	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60
NOTE: *The lower limit shall apply at the transition frequency.*		

4.2 EUT Setup

The conducted emissions tests were performed on the Ground Plane Test Site, using the setup in accordance with ANSI C63.4 measurement procedures. The specifications used were in accordance with FCC 15B Class A limits.

If applicable, the spacing between the peripherals was 10 cm.

If applicable, the external I/O cables were draped along the test table and bundled as required.

The EUT was connected (via LISN) to an EMI-filtered AC power receptacle.

4.3 Test Procedure

During the conducted emissions test, the power cord of the EUT was connected to the LISN.

4.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL) and the Attenuator Factor (Atten) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CL + Atten

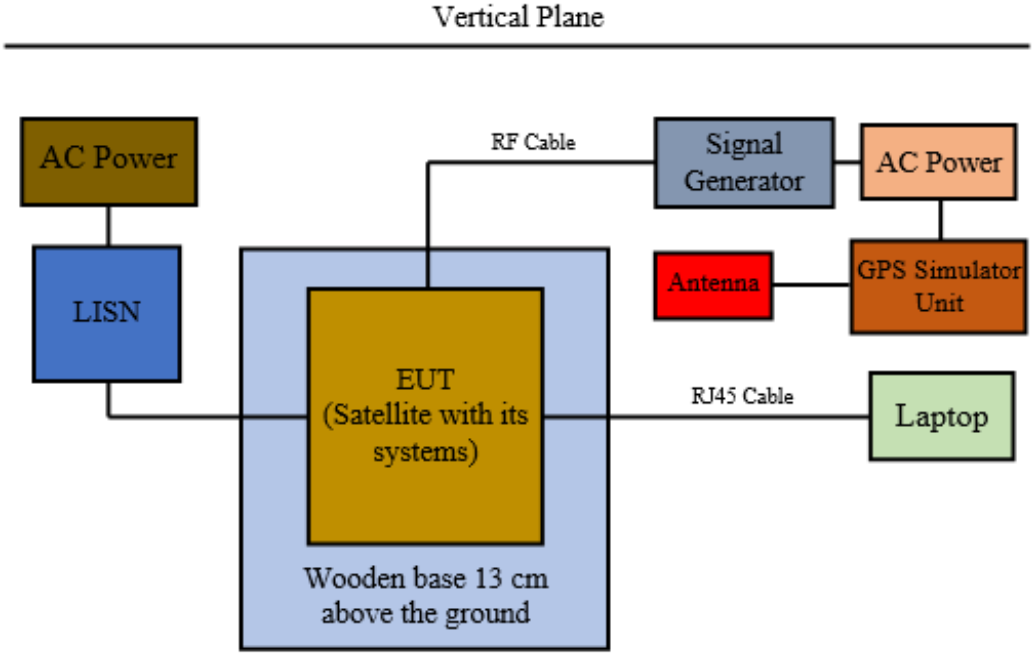
For example, a corrected amplitude of 46 dBµV = Indicated Reading (32.5 dBµV) + Cable Loss (3.5 dB) + Attenuator (10 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class A. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Class A Limit

4.5 Test Setup Block Diagram

AC Line



4.6 Test Equipment List and Details

BACL #	Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
00322	Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950K03	100337	2019-07-19	2021-07-19
00680	Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101964	2020-07-02	2021-07-02
00724	Solar Electronics Company	High Pass Filter	Type 7930-100	7930150202	2019-02-25	2021-02-27
00776	Narda	LISN	L3-100	110WT50602	2019-11-13	2020-11-13
01006	Spirent Communications	Signal Generator	GSS7000	0213	Calibration not Required	Calibration not Required
01007	Spirent Communications	Interface Signal Generator	GSS7725	0020	Calibration not Required	Calibration not Required
01008	Dell	Desktop Computer	OptiPlex 3050	JGWMPJ2	Calibration not Required	Calibration not Required
00187	A.R.A	Antenna, Horn	DRG-118/A	1132	2020-02-25	2022-02-25
00343	HP	Signal Generator	8648C	3847M00143	2020-01-28	2021-01-28
00603	UTiFLEX	RF Microwave Cable Assembly	UFB142C-1-1800-200200	223458-004	2019-09-27	2020-09-27
00885	Fairview Microwave	Micro-Coax Cable	FMC0101223-240	1907181	2019-07-18	2020-07-18
00344	Behlman	Generator, Variable Voltage	BL12000C-1	6867	Calibration not Required	Calibration not Required

***Statement of Traceability*:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 9 June 2016) "A2LA Policy on Metrological Traceability".

4.7 Test Environmental Conditions

Testing Date:	2020-07-14
Testing Site:	Ground Plane Test Site
Temperature:	24 ºC
Relative Humidity:	40 %
ATM Pressure:	101.6 kPa
Testing Personnel:	Steven Lianto

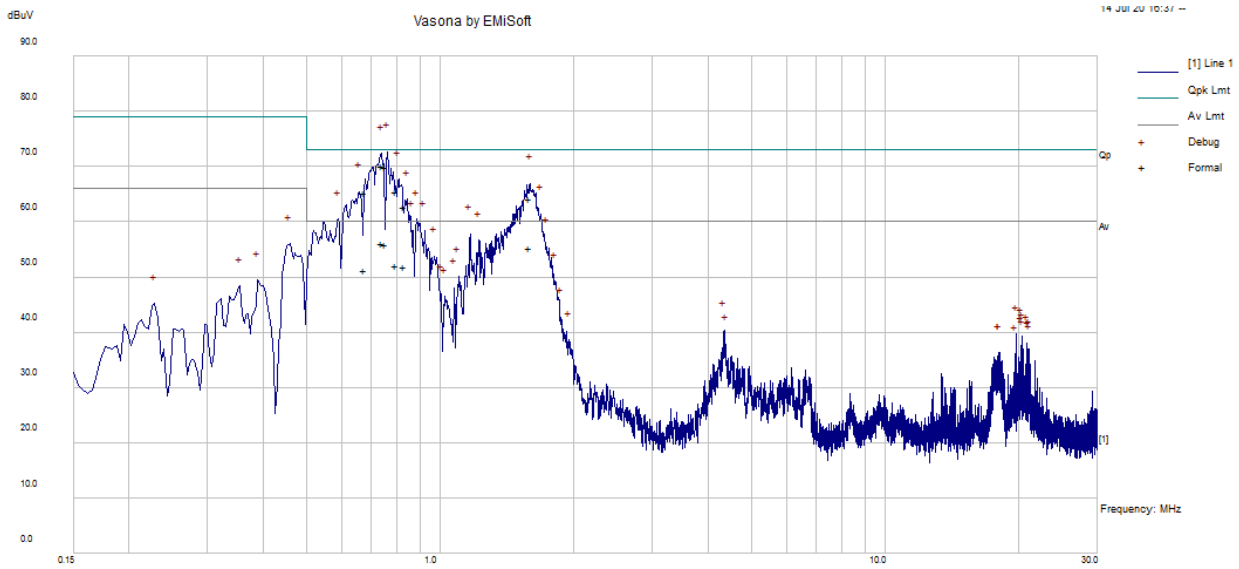
4.8 Summary of Test Results

According to the recorded data, the EUT complied with FCC §15.107, ICES-003 Class A limits, and had the worst margin reading of:

Standalone Cellular mode: Worst Case: AC Line: 240VAC/60 Hz						
Conductor (Line/Neutral)	**Quasi- Peak Frequency (MHz)**	**Highest Quasi-Peak Corrected Amplitude (dBµV)**	**Worst-Case Quasi-Peak Margin (dB)**	**Average Frequency (MHz)**	**Highest Average Corrected Amplitude (dBµV)**	**Worst-Case Average Margin (dB)**
Line	0.740711	70.27	-2.73	0.740711	56.07	-3.93
Neutral	0.741719	70.98	-2.02	0.782199	57.57	-2.43

4.9 Conducted Emissions Test Plots and Data

AC Line: 240 V/60 Hz Line



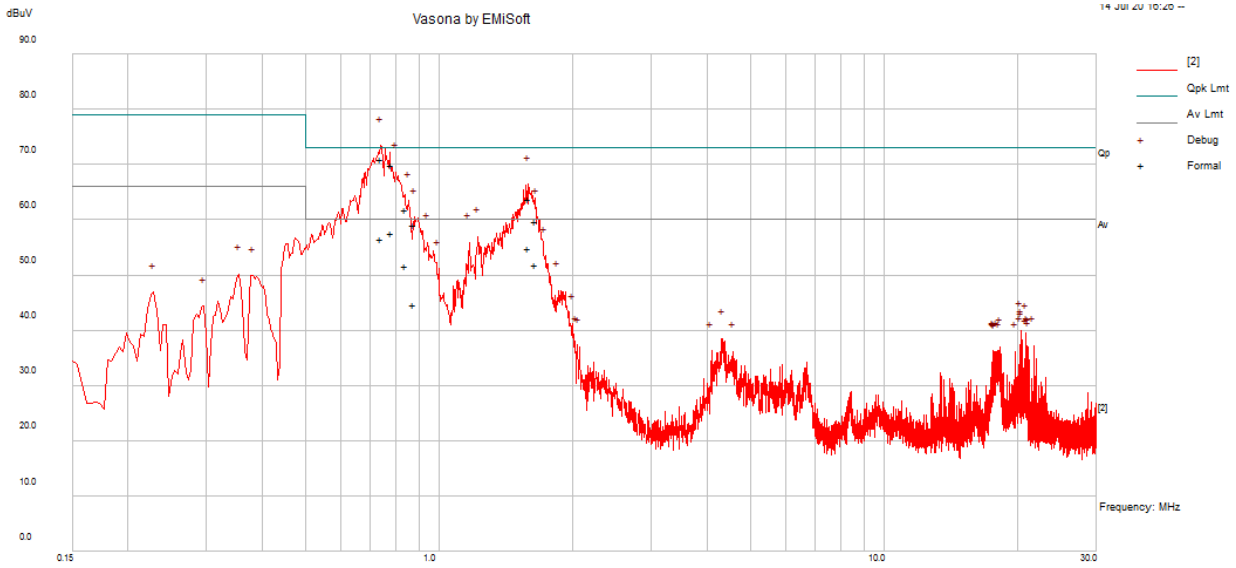
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.740711	70.27	Line	73	-2.73
0.75284	69.86	Line	73	-3.14
0.793622	65.57	Line	73	-7.43
0.674332	65.37	Line	73	-7.63
1.584137	64.2	Line	73	-8.8
0.831441	62.78	Line	73	-10.22

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.740711	56.07	Line	60	-3.93
0.75284	56.02	Line	60	-3.98
1.584137	55.39	Line	60	-4.61
0.793622	52.04	Line	60	-7.96
0.831441	51.85	Line	60	-8.15
0.674332	51.34	Line	60	-8.66

AC Line: 240 V/60 Hz Neutral



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.741719	70.98	Neutral	73	-2.02
0.782199	69.97	Neutral	73	-3.03
1.58526	63.76	Neutral	73	-9.24
0.837758	61.84	Neutral	73	-11.16
1.647902	59.84	Neutral	73	-13.16
0.875362	59.04	Neutral	73	-13.96

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.782199	57.57	Neutral	60	-2.43
0.741719	56.63	Neutral	60	-3.37
1.58526	54.95	Neutral	60	-5.05
1.647902	51.92	Neutral	60	-8.08
0.837758	51.69	Neutral	60	-8.31
0.875362	44.66	Neutral	60	-15.34

5 FCC §15.109, ICES-003 - Radiated Emissions

5.1 Applicable Standard

As per FCC §15.109: Radiated Emission Limits

(b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency of Emission (MHz)	Field Strength (µV/m)
30 MHz to 88 MHz	90
88 MHz - 216 MHz	150
216 MHz - 960 MHz	210
Above 960 MHz	300

(g) As an alternative to the radiated emission limits shown in paragraphs (a) and (b) of this section, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22: "Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement."

NOTE 1: The lower limit shall apply at the transition frequency.
NOTE 2: Additional provisions may be required for cases where interference occurs.

As per ICES-003 Subclause 6.2.1, Limits below 1 GHz:

An ITE meeting the conditions for Class A operation shall comply with the Class A radiated limits set out in Table 4 determined at a distance of 10 meters.

Table 4 –Class A Radiated Limits below 1 GHz

Frequency Range (MHz)	Quasi-peak Limits (dBµV/m)
30 MHz to 88 MHz	39
88 MHz to 216 MHz	43.5
216 MHz to 960 MHz	46.4
960 MHz to 1000 MHz	49.5
NOTE 1: The lower limit shall apply at the transition frequency. *NOTE 2: Additional provisions may be required for cases where interference occurs.*	

As per ICES-003 Subclause 6.2.1, Limits above 1 GHz:

Radiated disturbance measurements above 1 GHz shall be performed over the frequency range determined from Table 3. The appropriate average detector to carry out radiated disturbance measurements above 1 GHz shall be the linear average detector as defined in CISPR 16-1-1.

An ITE meeting the conditions for Class A equipment shall comply with the Class A radiated limits set out in Table 6 determined at a distance of 10 meters.

Table 6 –Class A Radiated Limits above 1 GHz

Frequency Range (MHz)	Quasi-peak Limits (dBµV/m)	
	Average	Peak
> 1000 MHz	49.5	69.5

5.2 EUT Setup

The radiated emissions tests were performed in the 10-meter test chamber, using the setup in accordance with ANSI C63.4, CISPR 22 measurement procedures. The specifications used were in accordance with FCC 15B and CISPR 22 Class A limits.

If applicable, the spacing between the peripherals was 10 cm.

If applicable, the external I/O cables were draped along the test table and bundled as required.

The EUT was connected to 240 VAC, 60 Hz single phase power supply.

5.3 Test Procedure

Maximization procedure was performed on the six (6) highest emissions readings to ensure the EUT is compliant with all installation combinations.

All data was recorded in the Quasi-Peak detection mode for below 1 GHz and Max Peak and Average detection mode for above 1 GHz.

5.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

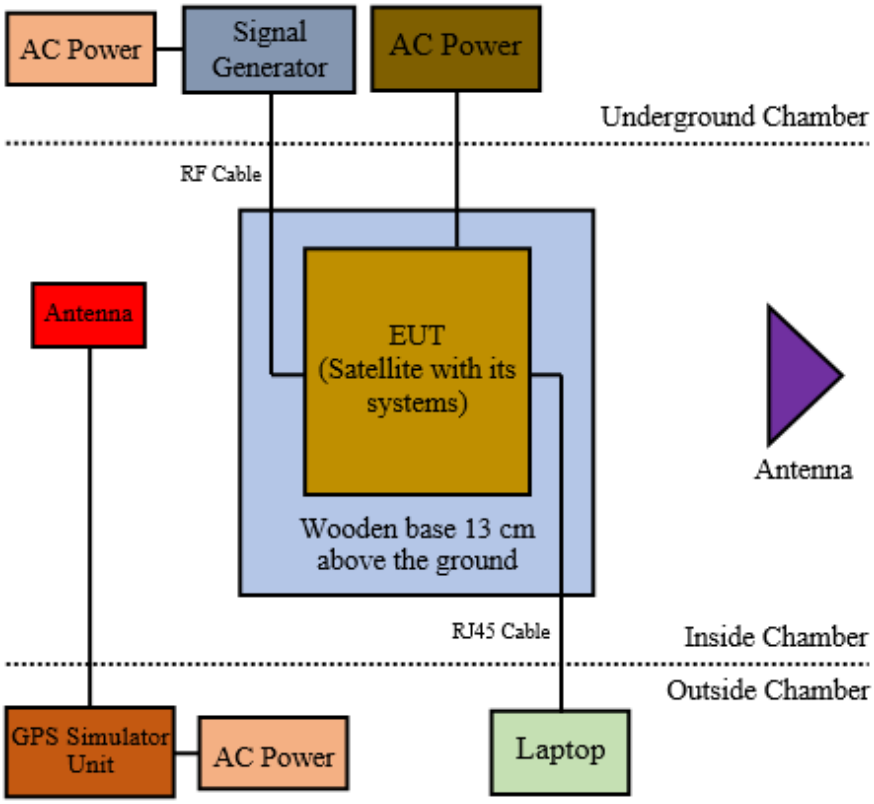
CA = Ai + AF + CL + Atten – Ga

For example, the Corrected Amplitude (CA) of 40.3 dBµV/m = indicated Amplitude reading (Ai) 32.5 dBµV + Antenna Factor (AF) 23.5dB + Cable Loss (CL) 3.7 dB + Attenuator (Atten) 10 dB - Amplifier Gain (Ga) 29.4 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit for Class A. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBµV/m) - Class A Limit (dBµV/m)

5.5 Test Setup Block Diagram



5.6 Test Equipment List and Details

BACL Asset #	Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
00124	Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2018-10-26	2020-10-26
00311	Sunol Sciences	Controller, System	SC104V	113005-1	Calibration not Required	Calibration not Required
00316	SONOMA INSTRUMENT	Amplifier	315	260406	2019-11-04	2020-11-04
00714	Keysight Technologies	RF Limiter	11867A	MY42242932	2020-01-30	2021-01-30
00307	Sunol Sciences	Antenna, BiConiLog	JB3	A020106-3	2020-03-02	2022-03-02
00831	Rohde & Schwarz	EMI Test Receiver	ESU-40	100433	2020-04-28	2021-04-28
00110	A.H. Systems	Antenna, Horn	SAS-200/571	261	2019-06-07	2021-06-07
00032	HP	Pre-Amplifier	8449B	3008A01978	2019-09-27	2020-09-27
00091	Wisewave	Antenna, Horn	ARH-4223-02	10555-02	2020-02-05	2022-02-05
00230	Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2020-02-27	2022-02-27
00827	A.H. System	Pre-amplifier	PAM-1840VH	170	2019-09-24	2020-09-24
01006	Spirent Communications	Signal Generator	GSS7000	0213	Calibration not Required	Calibration not Required
01007	Spirent Communications	Interface Signal Generator	GSS7725	0020	Calibration not Required	Calibration not Required
01008	Dell	Desktop Computer	OptiPlex 3050	JGWMPJ2	Calibration not Required	Calibration not Required
00187	A.R.A	Antenna, Horn	DRG-118/A	1132	2020-02-25	2022-02-25
01073	Wireless Solutions	N-Type Coax Cable	LMR 400	690	2020-03-27	2021-03-27
00343	HP	Signal Generator	8648C	3847M00143	2020-01-28	2021-01-28
00601	UTiFLEX	High Frequency Cable	UFA147A-1-3600-200200	223458-001	2020-07-10	2021-07-10
00603	UTiFLEX	RF Microwave Cable Assembly	UFB142C-1-1800-200200	223458-004	2019-09-27	2020-09-27
00344	Behlman	Generator, Variable Voltage	BL12000C-1	6867	Calibration not Required	Calibration not Required

***Statement of Traceability*:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 9 June 2016) "A2LA Policy on Metrological Traceability".

5.7 Test Environmental Conditions

Testing Date:	2020-07-13
Testing Site:	10m Chamber 1
Temperature:	25 ºC
Relative Humidity:	44 %
ATM Pressure:	101.8 kPa
Testing Personnel:	Steven Lianto

5.8 Summary of Test Results

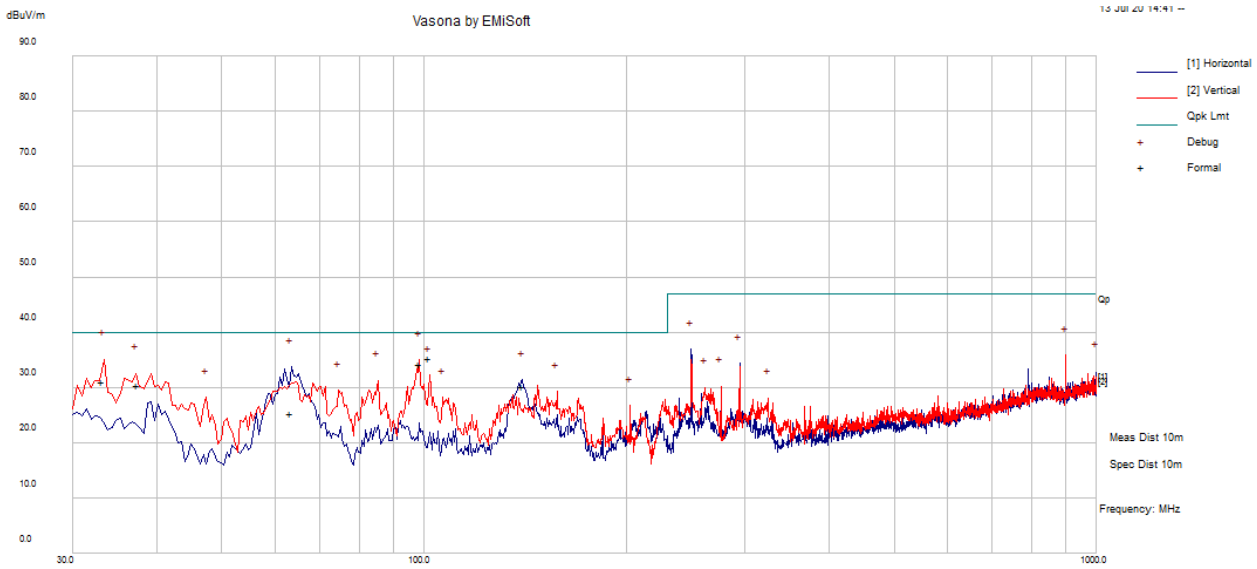
According to the recorded data, the EUT complied with FCC §15.109, ICES-003 Class A limits, and had the worst margin reading of:

Radiated Emissions Worst Case (30 MHz to 1 GHz)			
Frequency (MHz)	**Highest Quasi-Peak Corrected Amplitude (dBµV/m)**	**Polarization (Horizontal/Vertical)**	**Quasi-Peak Margin (dB)**
101.8695	35.39	Vertical	-4.61

Radiated Emissions Worst Case (Above 1 GHz)			
Frequency (MHz)	**Highest Peak Corrected Amplitude (dBµV/m)**	**Polarization (Horizontal/Vertical)**	**Peak Margin (dB)**
39765.12	70.67	Horizontal	-8.83
Frequency (MHz)	**Highest Average Corrected Amplitude (dBµV/m)**	**Polarization (Horizontal / Vertical)**	**Average Margin (dB)**
39765.12	57.22	Horizontal	-2.28

5.9 Radiated Emissions Test Plot and Data

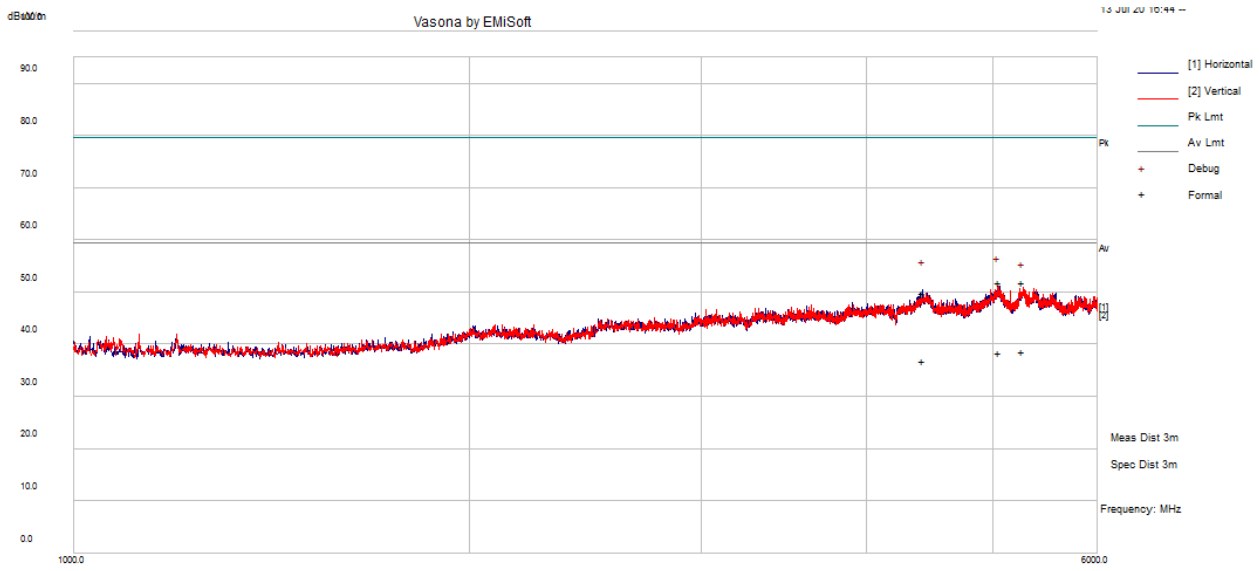
1) 30 MHz to 1000 MHz at a 10m test distance



Quasi-Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
101.8695	35.39	V	214	204	40	-4.61
98.3985	34.14	V	107	7	40	-5.86
33.1765	31.04	V	194	155	40	-8.96
37.51	30.47	V	108	2	40	-9.53
140.1883	30.14	H	296	235	40	-9.86
63.271	25.29	H	325	170	40	-14.71

2) 1 GHz to 6 GHz at a 3m test distance



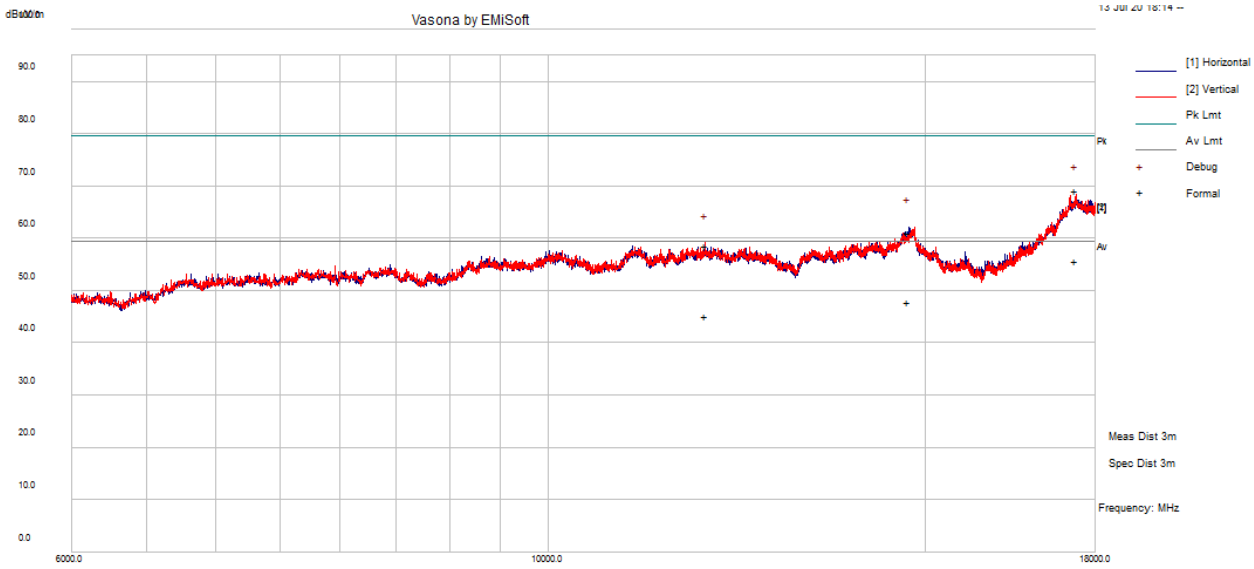
Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
5266.676	51.9	V	138	115	79.5	-27.6
5046.778	51.75	V	391	326	79.5	-27.75
4419.627	49.86	H	109	51	79.5	-29.64

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
5266.676	38.68	V	138	115	59.5	-20.82
5046.778	38.47	V	391	326	59.5	-21.03
4419.627	36.77	H	109	51	59.5	-22.73

3) 6 GHz to 18 GHz at a 3m test distance



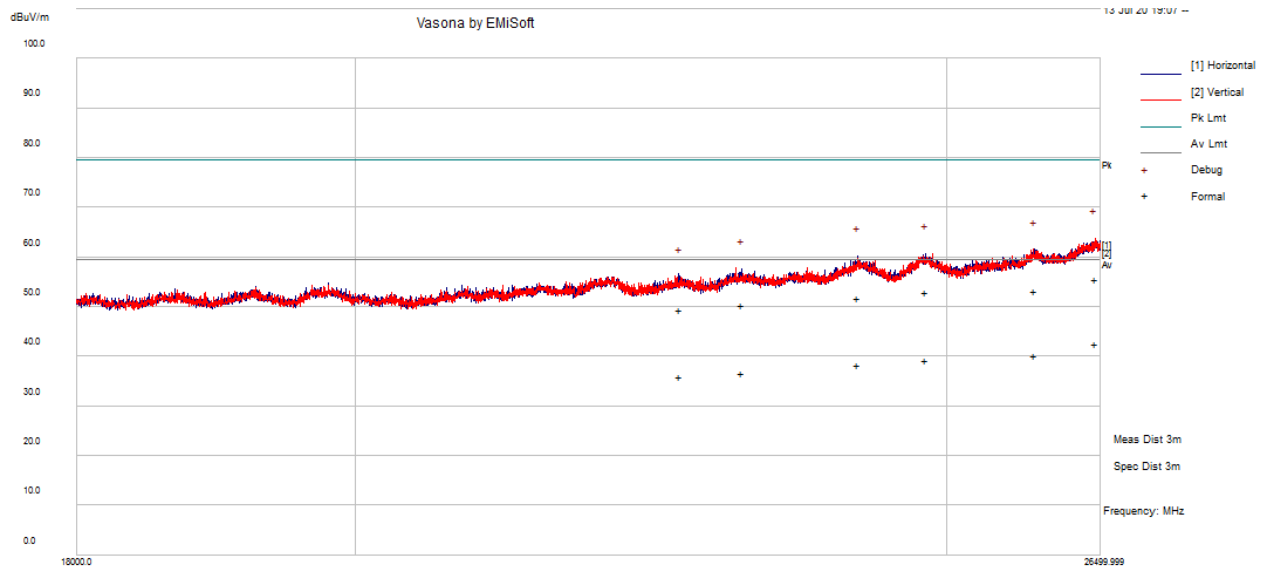
Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
17620.93	69.13	V	239	90	79.5	-10.37
14723.83	61.11	H	311	234	79.5	-18.39
11842.19	58.48	V	345	356	79.5	-21.02

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
17620.93	55.66	V	239	90	59.5	-3.84
14723.83	47.89	H	311	234	59.5	-11.61
11842.19	45.08	V	345	356	59.5	-14.42

4) 18 GHz to 26.5 GHz at a 3m test distance



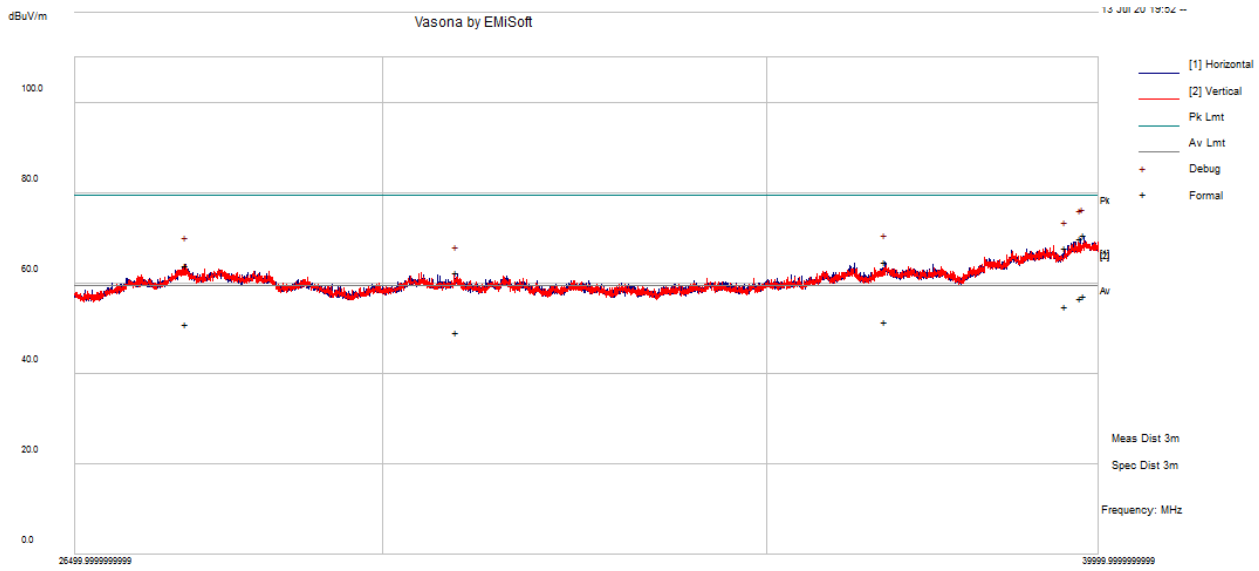
Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
26447.93	55.44	V	160	7	79.5	-24.06
25848.35	53.15	H	108	87	79.5	-26.35
24810.6	53.04	H	183	132	79.5	-26.46
24181.4	51.67	H	180	201	79.5	-27.83
23140.45	50.44	H	140	294	79.5	-29.06
22604.23	49.47	H	125	105	79.5	-30.03

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
26447.93	42.43	V	160	7	59.5	-17.07
25848.35	40.2	H	108	87	59.5	-19.3
24810.6	39.31	H	183	132	59.5	-20.19
24181.4	38.33	H	180	201	59.5	-21.17
23140.45	36.61	H	140	294	59.5	-22.89
22604.23	35.85	H	125	105	59.5	-23.65

5) 26.5 GHz to 40 GHz at a 3m test distance



Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
39765.12	70.67	H	104	166	79.5	-8.83
39712.4	69.97	H	168	309	79.5	-9.53
39472.02	67.89	H	170	319	79.5	-11.61
36714.19	64.72	H	140	226	79.5	-14.78
27711.78	63.91	H	127	320	79.5	-15.59
30906.98	62.49	H	175	341	79.5	-17.01

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
39765.12	57.22	H	104	166	59.5	-2.28
39712.4	56.58	H	168	309	59.5	-2.92
39472.02	54.95	H	170	319	59.5	-4.55
36714.19	51.34	H	140	226	59.5	-8.16
27711.78	50.86	H	127	320	59.5	-8.64
30906.98	49.22	H	175	341	59.5	-10.28

6 Annex A (Normative) - EUT External Photographs

Please refer to the attachment

7 Annex B (Normative) - EUT Internal Photographs

Please refer to the attachment

8 Annex C (Normative) - Test Setup Photographs

Please refer to the attachment

9 Annex D (Normative) - ISO/IEC 17025 Certificate and Scope of Accreditation

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets A2LA *R222 - Specific Requirements EPA ENERGY STAR Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 2nd day of October 2018.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to November 30, 2020
Revised August 31, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

--- END OF REPORT ---