

November 13, 2020

Mobilogix Inc.
5500 Trabuco Road, Suite 150
Irvine, CA 92620
USA

Dear Ramy Mourad,

Enclosed is the EMC Wireless test report for compliance testing of the Mobilogix Inc., ATD310B as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15 Subpart C for Intentional Radiators.

Thank you for using the services of Eurofins E&E North America. If you have any questions regarding these results or if we can be of further service to you, please feel free to contact me.

Sincerely yours,
EUROFINS E&E NORTH AMERICA



Arsalan Hasan
Wireless Laboratory

Reference: (\Mobilogix Inc.\WIRS109720-FCC-247 Rev 1)



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Electromagnetic Compatibility Criteria Test Report

for the

**Mobilogix Inc.
ATD310B**

Tested under
the FCC Certification Rules
contained in
15.247 Subpart C for Intentional Radiators

Report: WIRS109720-FCC-247 Rev 1

November 13, 2020

Prepared For:

**Mobilogix Inc.
5500 Trabuco Road, Suite 150
Irvine, CA 92620
USA**

Prepared By:
Eurofins E&E North America
3162 Belick St., Santa Clara, CA 95054

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**Mobilogix Inc.
ATD310B****Tested under
the FCC Certification Rules
contained in
15.247 Subpart C for Intentional Radiators**Joseph Fale
Engineer, Wireless LaboratoryArsalan Hasan
Manager, Wireless Laboratory

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 the FCC Rules Part 15.247 under normal use and maintenance.

Eleazar Zuniga, PhD.
Director, Wireless Technologies

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	November 12, 2020	Initial Issue.
1	November 13, 2020	TCB Updates.

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List of Terms and Abbreviations

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

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Mobilogix Inc. ATD310B, with the requirements of Part 15, §15.247. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the ATD310B. Mobilogix Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the ATD310B, 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 15, §15.247, in accordance with Mobilogix Inc., purchase order number MOB2016. All tests were conducted using measurement procedure ANSI C63.4-2014.

FCC Reference 47 CFR Part 15.247:2005	Description	Compliance
Title 47 of the CFR, Part 15 §15.203	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	Conducted Emission Limits	Not Applicable
Title 47 of the CFR, Part 15 §15.247(a)(2)	6dB Occupied Bandwidth	Data valid from module original certification FCC ID: HSW2832
Title 47 of the CFR, Part 15 §15.247(b)	Peak Power Output	Data valid from module original certification FCC ID: HSW2832
Title 47 of the CFR, Part 15 §15.247(c)	Spurious Emissions in Non-restricted Bands	Data valid from module original certification FCC ID: HSW2832
Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205	Radiated Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15; §15.247(e)	Peak Power Spectral Density	Data valid from module original certification FCC ID: HSW2832

Table 1. Executive Summary of EMC Part 15.247 Compliance Testing

Rationale: Per KDB KDB 996369 D04 “Modular Transmitter Integration Guide – Guidance for Host Product Manufacturers” only worst-case radiated measurements are reported in this filing.

II. Equipment Configuration

A. Overview

Eurofins E&E North America was contracted by Mobilogix Inc. to perform testing on the ATD310B, under Mobilogix Inc.’s purchase order number MOB2016.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Mobilogix Inc., ATD310B.

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

Model(s) Tested:	ATD310B	
Model(s) Covered:	ATD310B	
EUT Specifications:	Primary Power: 36V DC	
	FCC ID: 2AH4HATD310B	
	Module Original Report Number(s): Report: AT72126480-1C1	
	Type of Modulations:	GFSK
	Equipment Code:	DTS
	Peak RF Output Power:	3.35 dBm
	EUT Frequency Ranges:	2402 – 2480 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:	Arsalan Hasan	
Report Date(s):	November 13, 2020	

Table 2. EUT Summary Table

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
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
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
KDB 558074 v04	Guidance For Performing Compliance Measurements On Digital Transmission Systems (DTS) Operating Under Section 15.247

Table 3. References

C. Test Site

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

All testing was performed at Eurofins E&E North America, 3162 Belick St., Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at Eurofins E&E North America.

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty (dB)	K	Confidence Level
Radiated Emissions, (30 MHz – 1 GHz)	±3.24	2	95%
Radiated Emissions, (1 - 25 GHz)	±3.92	2	95%
Conducted Emission	±3.53	2	95%
CEV Telecom Port	±2.44	2	95%

Table 4. Uncertainty Calculations Summary

E. Description of Test Sample

The Mobilogix Inc. ATD310B is a This is a Wireless Headlight Controller (WHC) multi-functional device with Cellular, Bluetooth, and NFC communications interfaces. The device will draw power from a host asset when available and has an onboard battery if the host power is unavailable. When powered the device enters sleep mode. There is no on/off switch, the button will wake up the device from Sleep Mode.

The device will remain in Sleep Mode while stationary. When moved unexpectedly the device will send current location and sensor information to home server to report the unauthorized movement. When device obtains authorization be moved it goes into Trip Mode. In this mode the device logs sensor and location information. When the user ends Trip Mode the data is reported to a cloud server and the device returns to Sleep Mode.

F. Equipment Configuration

Ref. ID	Slot #	Name / Description	Model Number	Part Number (White / Light Almond)	Serial Number	Rev. #
1	NA	Wireless Headlight Controller (WHC)	ATD310B	A310B200200804S	A310B200200804S	NA

Table 5. Equipment Configuration

G. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

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

Table 6. Support Equipment

H. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
1	Handlebar	EUT is in test mode, this port is not active for wireless testing purposes.	NA	NA	NA	NA	NA
2	Speaker	EUT is in test mode, this port is not active for wireless testing purposes.	NA	NA	NA	NA	NA
3	Lock Mech	EUT is in test mode, this port is not active for wireless testing purposes.	NA	NA	NA	NA	NA
4	CAN Interface	EUT is in test mode, this port is not active for wireless testing purposes.	NA	NA	NA	NA	NA
5	Headlight	EUT is in test mode, this port is not active for wireless testing purposes.	NA	NA	NA	NA	NA

Table 7. Ports and Cabling Information

I. Mode of Operation

The ATD310B was paired with Mobile App to exercise the BLE radio.

J. Method of Monitoring EUT Operation

Use RF Studio to monitor the Bluetooth transmission of the device.

K. 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.

L. Disposition of EUT

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

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement: § 15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

- a.) Antenna must be permanently attached to the unit.
- b.) Antenna must use a unique type of connector to attach to the EUT.
- c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The EUT as tested is compliant the criteria of §15.203.

Test Engineer(s): Joseph Fale

Test Date(s): 11/12/2020

Antenna Type:	Manufacturer	Gain (dBi):	Impedance	Polarization
On-Board PCB Antenna	Murata	2.0	50 Ω	Linear

Table 8. Antenna List

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209 Radiated Spurious Emissions Requirements

Test Requirements: §15.247(d); §15.205: Emissions outside the frequency band.

§15.205(a): Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110-----	16.42–16.423	399.9–410	4.5–5.15
¹ 0.495–0.505-----	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905-----	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128-----	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775-----	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775-----	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218-----	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825-----	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225-----	123–138	2200–2300	14.47–14.5
8.291–8.294-----	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366-----	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675-----	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475-----	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293-----	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025-----	240–285	3345.8–3358 36.	43–36.5
12.57675–12.57725-----	322–335.4	3600–4400	(²)

Table 9. Restricted Bands of Operation

¹ Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.

² Above 38.6

Test Requirement(s): § 15.209 (a): Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 10.

Frequency (MHz)	§ 15.209(a), Radiated Emission Limits (dBµV) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Table 10. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedures: The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line. Only noise floor was measured above 18 GHz.

Test Results: The EUT was compliant with the Radiated Spurious Emission limits of § 15.247(d) and § 15.209.

Test Engineer(s): Joseph Fale

Test Date(s): 11/12/2020

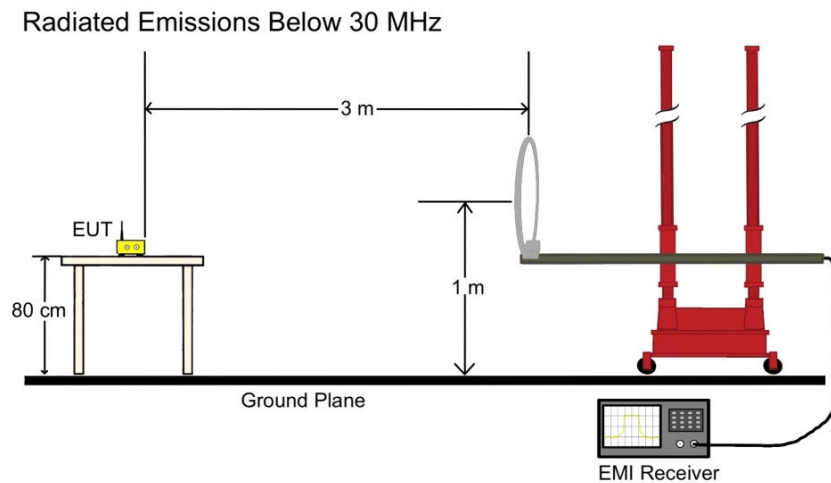


Figure 1: Radiated Emissions, Below 30MHz, Test Setup

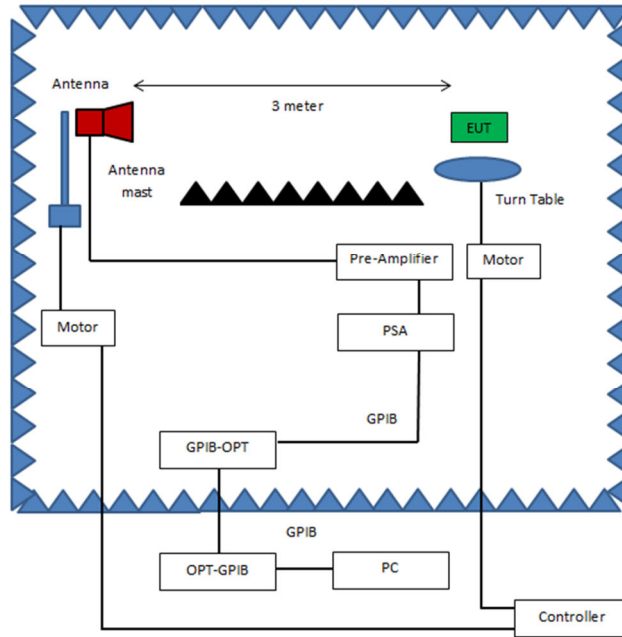


Figure 2: Radiated Emissions - Above 1GHz - Block Diagram

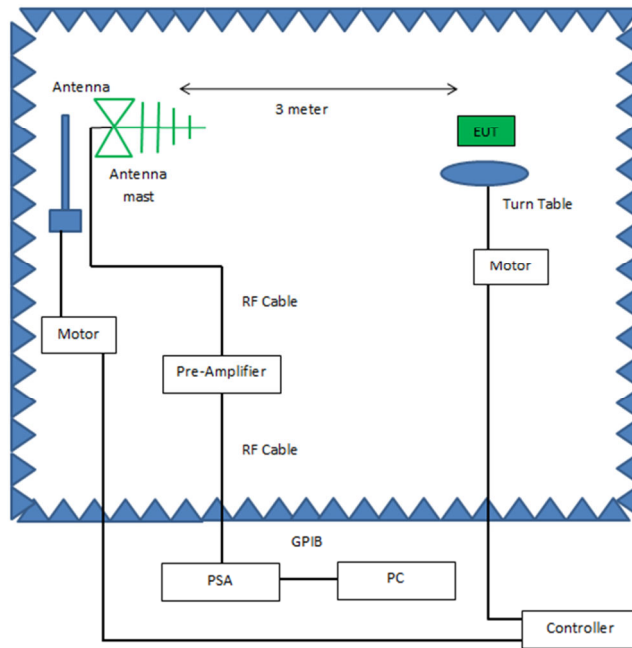
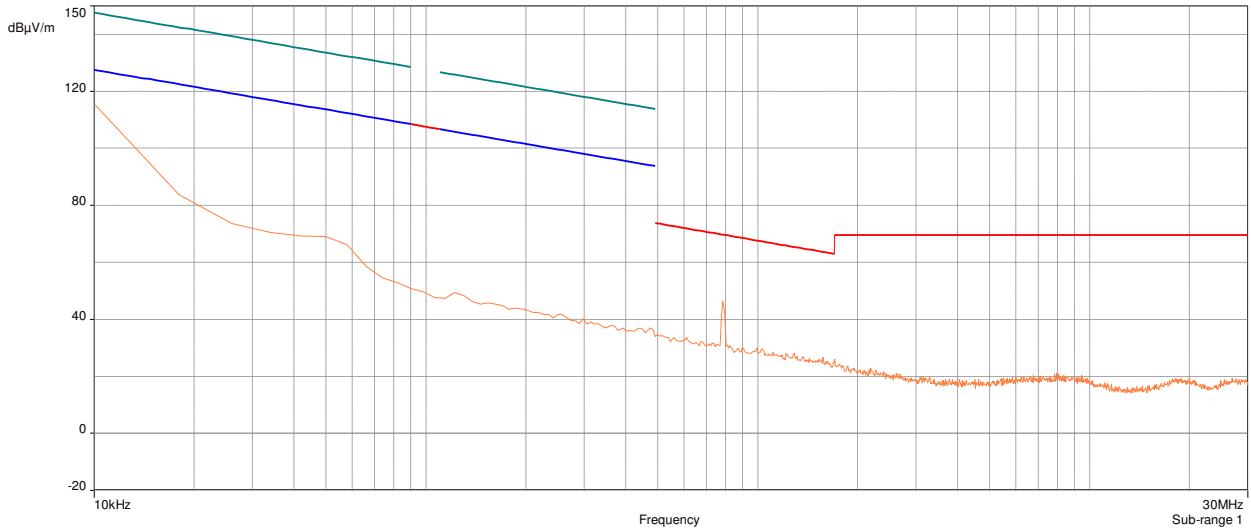
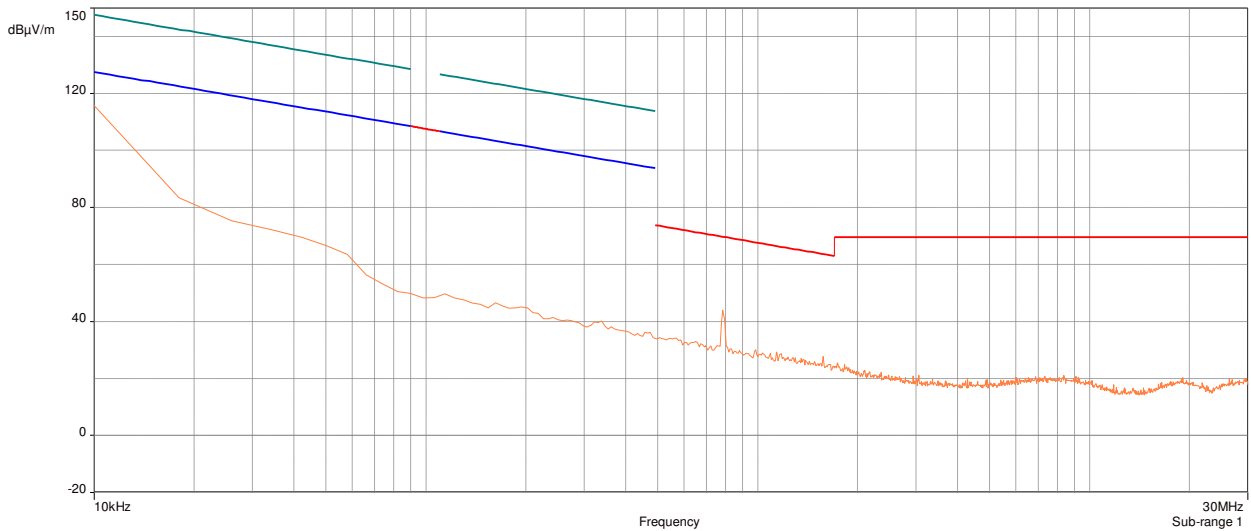


Figure 3: Radiated Emissions - Below 1GHz - Block Diagram

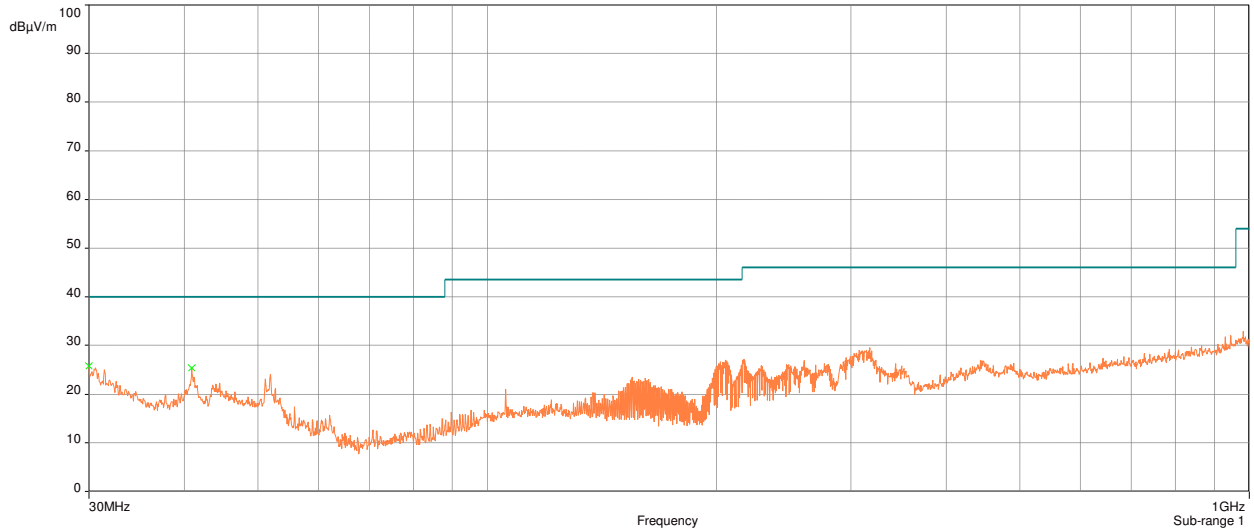
Radiated Spurious Emissions, Test Results



Plot 1: Radiated Spurious Emissions, Below 30MHz, X-Axis

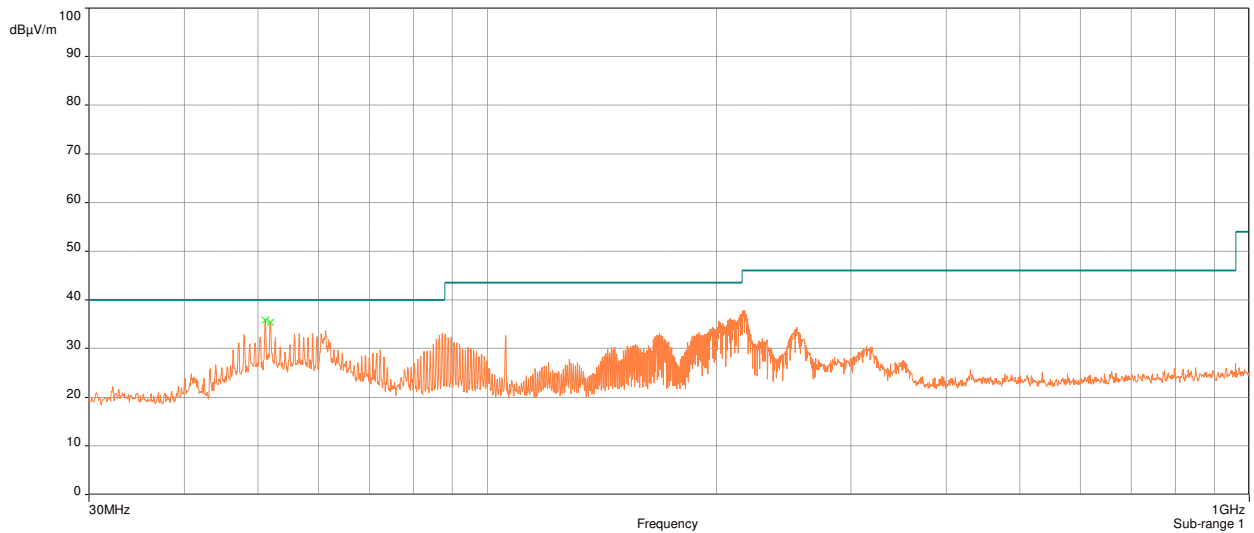


Plot 2: Radiated Spurious Emissions, Below 30MHz, Y-Axis



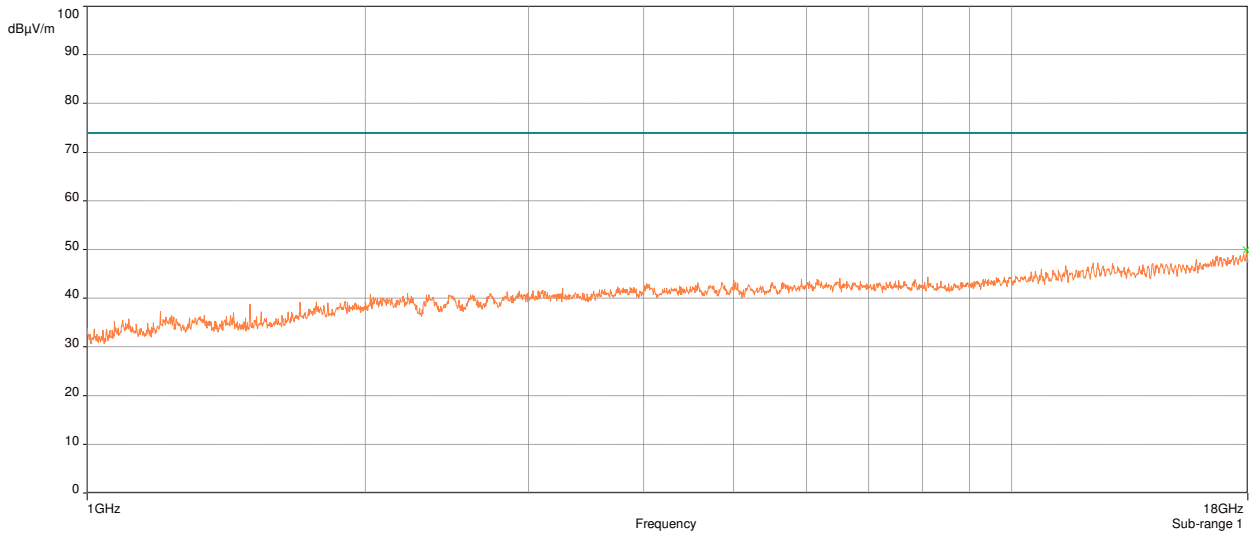
X1: 24.8 dBuV X2: 24.7 dBuV

Plot 3: Radiated Spurious Emissions, BLE, 30 MHz - 1 GHz, Horizontal (Worst Case)

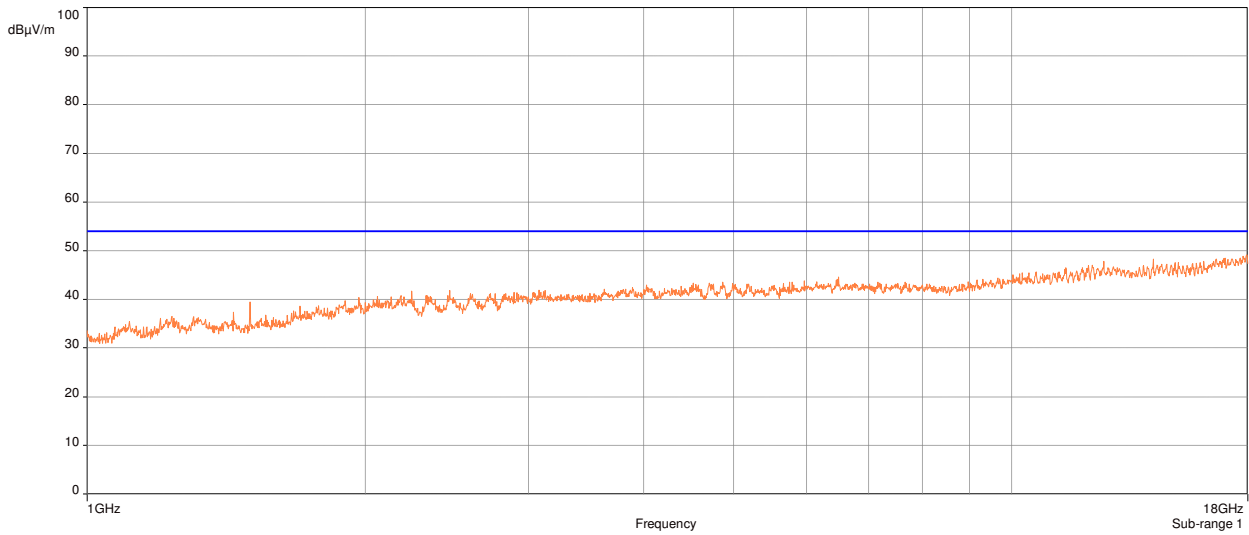


X1: 35.2 dBuV X2: 34.8 dBuV

Plot 4: Radiated Spurious Emissions, BLE, 30 MHz - 1 GHz, Vertical (Worst Case)

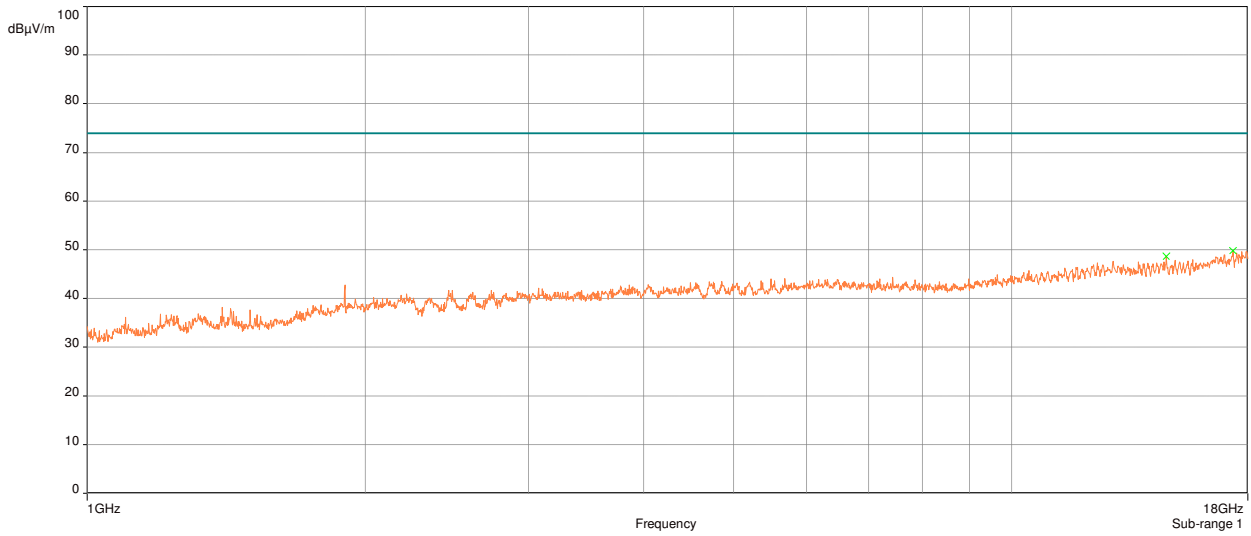


Plot 5: Radiated Spurious Emissions, 1GHz – 18GHz, Peak. Vertical (Worst Case)

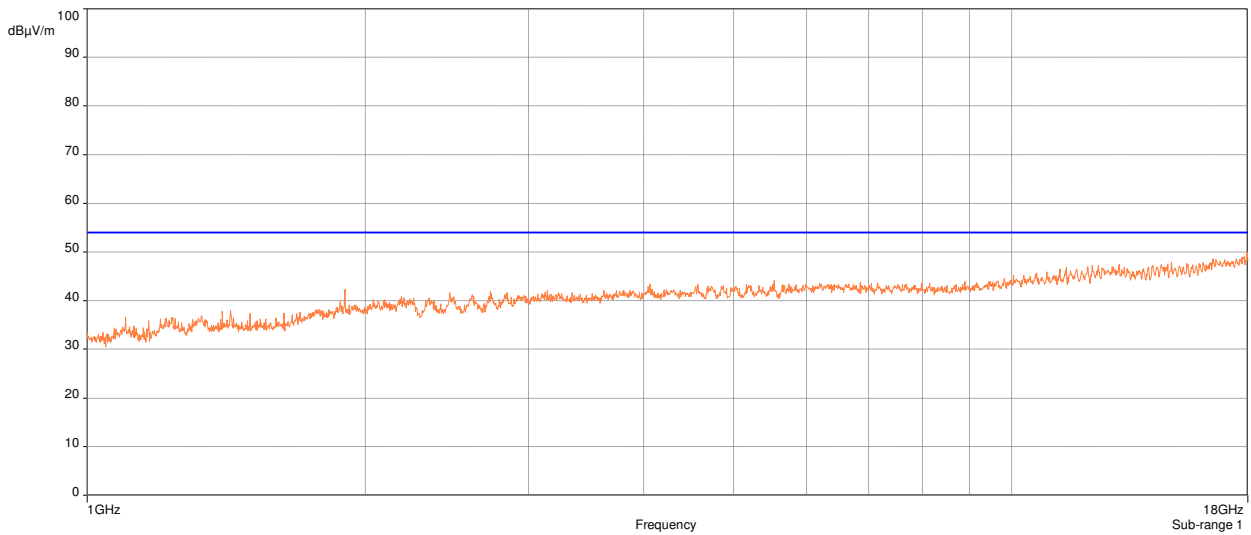


Plot 6: Radiated Spurious Emissions, 1GHz – 18GHz, Average. Vertical (Worst Case)

Note: A Notch Filter was used to notch-out the BLE signals.



Plot 7: Radiated Spurious Emissions, 1GHz – 18GHz, Peak. Horizontal (Worst Case)



Plot 8: Radiated Spurious Emissions, 1GHz – 18GHz, Average. Horizontal (Worst Case)

Note: A Notch Filter was used to notch-out the BLE signals.

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 17025:2005.

ASSET #	NOMENCLATURE	MANUFACTURER	MODEL	LAST CAL	CAL DUE
1S2399	TURNTABLE CONTROLLER	SUNOL SCIENCE	SC99V	FUNCTIONAL VERIFY	
1S3928	EMI TESTER RECEIVER	ROHDE & SCHWARZ	ESR26	03/04/2020	03/04/2021
1S2600	BILOG ANTENNA	TESEQ	CBL6112D	03/19/2019	03/19/2021
1S3983	LOOP ANTENNA	ETS-LINDGREN	6512	09/26/2019	09/26/2021
1S2486	5 METER CHAMBER CONTROL ROOM	PANASHIELD	5 METER CONTROL ROOM	FUNCTIONAL VERIFY	
1S3926	1MHZ STEP, 1GHZ COMBO GENERATOR	COM-POWER CORP	CGO-501	FUNCTIONAL VERIFY	
1S4067	DIGITAL BAROMETER	CONTROL CO	6530	06/22/2020	06/22/2022
1S2481	10 METER CHAMBER	ETS-LINGREN	DKE-8X8 DBL	FUNCTIONAL VERIFY	
1S380	EMI RECEIVER	NARDA SAFETY TEST SOLUTIONS	PMM 9010F	8/23/2020	8/23/2021
1S245	COMB GENERATOR (RADIATED)	COM-POWER	GG510	FUNCTIONAL VERIFY	
1S2599	LASER PROBE INTERFACE	AMPLIFIER RESEARCH	F1700	FUNCTIONAL VERIFY	
1S2603	DOUBLE RIDGED WAVEGUIDE HORN	ETS-LINDGREN	3117	09/18/2020	09/18/2022
1S2000	SPECTRUM ANALYZER	AGILENT	E4448A	11/06/2019	11/06/2020
1S3818	DRG HORN ANTENNA	A.H. SYSTEMS, INC	SAS-574	09/24/2020	09/24/2022

Table 11: Test Equipment List

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

End of Report