HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

June 27, 2019

InVue Security
9201 Baybrooke Ln.
Charlotte, North Carolina 28277

Dear Yasu Tamura,

Enclosed is the EMC test report for limited compliance testing of the InVue Security, OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors, for Class B device, tested to the requirements of Title 47 of the CFR, Ch. 1 Part 18 Subpart B for Industrial, Scientific, and Medical (ISM) Equipment, Ultrasonic Devices..

Thank you for using the services of Eurofins MET Labs, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely,

Joel Huna
Documentation Department
Eurofins MET Labs, Inc.

Reference: (\InVue Security\EMC103549-FCC18)

ACCREDITED
TESTING CERT #0591.01

Electromagnetic Compatibility
Test Report

for

InVue Security
OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors

Tested under

Title 47 of the CFR, Part 18 Subpart B
for Industrial, Scientific, and Medical (ISM) Equipment, Ultrasonic Devices

MET Report: EMC103549-FCC18

June 27, 2019

Donald Salguero
Test Engineer, EMC Lab

Joel Huna
Documentation Department

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 applicable limits. 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 Title 47 of the CFR, Part 18, Subpart B for a Class B Digital Device under normal use and maintenance.

Christopher Dennison,
Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	June 27, 2019	Initial Issue.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
CISPR	**C**omite **I**nternational **S**pecial des **P**erturbations **R**adioelectriques (International Special Committee on Radio Interference)
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**micro**henry
µF	**micro**farad
µs	**micros**econds
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

Table 1: List of Abbreviations

1.0 Testing Summary

The following tests specified below were performed with the following results.

Reference and Test Description	Results	Comments
Title 47 of the CFR, Part 18 Subpart B - 18.309 (a) Conducted Emission Limits for Industrial, Scientific, and Medical (ISM) Equipment, Ultrasonic Devices	Compliant	
Title 47 of the CFR, Part 18 Subpart B - 18.305 (b) Radiated Emission Limits for Industrial, Scientific, and Medical (ISM) Equipment, Ultrasonic Devices	Compliant	

Table 2: Testing Summary

2.0 Equipment Configuration

2.1 Overview

Eurofins MET Labs, Inc. was contracted by InVue Security to perform testing on the OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors, under InVue Security purchase order number 64553.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the InVue Security, OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors.

In accordance with §2.955(a) (3), the following data is presented in support of the verification of the InVue Security, OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors. InVue Security should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors has been **permanently** discontinued, as per §2.955(b).

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

Model(s) Tested:	OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors
Model(s) Covered:	OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors
FCC ID:	2AFR8F1748A
Primary Power as Tested:	4.5 to 5.5VDC
Equipment Emissions Class:	B
Highest Clock Frequency:	6 MHz internal clock
Evaluated by:	Donald Salguero
Report Date:	June 27, 2019

Table 3. EUT Overview

2.2 Test Site

All testing was performed at Eurofins MET Labs, Inc., 914 West Patapsco Avenue, Baltimore, MD 21230 All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Eurofins MET Labs is a ISO/IEC 17025 accredited site by A2LA, Baltimore #0591.01.

Radiated Emissions measurements were performed in a semi-anechoic chamber. In accordance with §2.948(a)(3), a complete site description is contained at Eurofins MET Labs.

2.3 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%

Table 4. Uncertainty Calculations Summary

2.4 Description of Test Sample

The InVue Security OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors, Equipment Under Test (EUT), is a device used to charge smart watches using inductively coupled power transfer. The intent is to plug in the EUT on an OnePod sensor/stands (InVue Alarm security unit) and place the smart watch on top of open hoop sensor to display smart watches in a retail environment (in a store). The watch is placed in contact with the EUT. The EUT is not intended to charge the watch at a distance and watch will be stay on the charger at all the time during of display. Powering the EUT is a 5V wall outlet power supply connected to the attached cable with a USB-A connector.

2.5 Equipment Configuration

The EUT was set up as outlined in Figure 1. All equipment incorporated as part of the EUT is included in the following list.

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Rev. #
A		OnePod Wearable Samsung Galaxy Watch Open Hoop Sensors (EUT)	F1748	F1748101	N/A	0

Table 5. Equipment Configuration

2.6 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
B	Power Supply (DC 5V)	InVue	PS515	N/A
C	Smart Watch	Samsung	Galaxy Watch	N/A
D	One Pod Sensor	InVue	DBD210-W	N/A
E	One Pod Stand	InVue	DBD106-W	N/A
The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.				

Table 6. Support Equipment

2.7 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	Vin	2 conductors, 24AWG	1	1	1.1	No	B.Vout
2	Vin2	3 conductors, 24AWG	1	0.25	0.3	No	A.Vin2
3	RFout	Wireless power transfer (no cable)	1	N/A	N/A	No	C.RFin

Table 7. Ports and Cabling Information

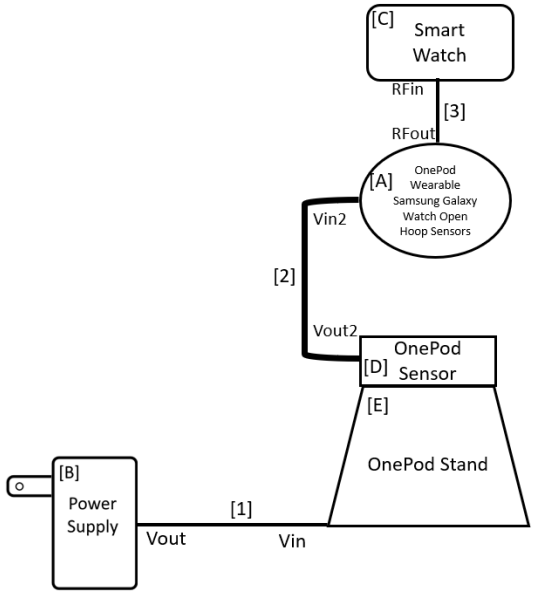


Figure 1. Block Diagram of Test Configuration

2.8 Mode of Operation

There is a device supplied for testing and it has production firmware (GE4_PV1) that utilizes the full frequency band (120kHz-190kHz). The device can be tested with the supplied smart watch placed on it's surface (charging mode) and without the smart watch (idle mode). For our intention is that the smart watch is always on the device and customers will not remove the watch from the stand. The watch is secured by metal arm and the EUT will alarm once the watch is removed from the stand. The mode requires an external 5V power supply (provided).

2.9 Method of Monitoring EUT Operation

1. The supplied smart watch will be charging when the EUT is performing its intended function. This can be observed by viewing the display of the watch when it is off (there will be a lightning bolt on the screen). If there is no battery display, pull down the watch screen and small battery icon should show up in the top of the watch screen. If charging, there should be a lightning bolt icon in the battery icon.
2. When the EUT is not functioning properly, there will not be a lightning bolt on the screen of the smart watch when placed on the charger.

2.10 Modifications

2.10.1 Modifications to the EUT

No modifications were made to the EUT.

2.10.2 Modifications to the Test Standard

No modifications were made to the test standard.

2.11 Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electro-Magnetic Compatibility Lab for testing was returned to InVue Security upon completion of testing.

2.12 Test Software Used

Conducted Emissions - Trace Data Grabber version 01/26/2016
Radiated Emissions- EMC-REG-TDS-11, Radiated Emissions Prescan.xls version 06/29/11

3.0 Electromagnetic Compatibility Emission Criteria

3.1 Conducted Emission Limits

Test Requirement(s): **18.307** For the following equipment, when 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 shall not exceed the limits in the following tables. 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 using a 50 µH/50 Ohms Line Impedance Stabilization Network (LISN).

(b) All other part 18 consumer devices:

Frequency of Emission (MHz)	18.307(a) ISM Conducted Limits (dBµV)	
	Quasi-Peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50
Note 1 — The lower limit shall apply at the transition frequencies. Note 2 — *The limit decreases linearly with the logarithm if the frequency in the range 0.05 MHz to 0.5 MHz.		

Table 8. Conducted Limits for ISM (Ultrasonic Equipment) calculated from FCC Part 18 Section 18.307(a)

18.311 The measurement techniques which will be used by the FCC to determine compliance with the technical requirements of this part are set out in FCC Measurement Procedure MP–5, ‘‘Methods of Measurements of Radio Noise Emissions from ISM equipment’’. Although the procedures in MP–5 are not mandated, manufacturers are encouraged to follow the same techniques which will be used by the FCC.

Test Procedure: The EUT was setup on a wooden table, 80cm above the ground plane. The method of testing, test conditions, and test procedures of CISPR 22 were used. The EUT was powered through a 50Ω/50µH LISN. An EMI receiver, connected to the measurement port of the LISN, scanned the frequency range from 150 kHz to 30 MHz in order to find the peak conducted emissions. All peak emissions within 20 dB of the limit, six highest peaks were re-measured using a quasi-peak and average detector.

Environmental Conditions for Conducted Emissions	
Ambient Temperature (°C)	21.1
Relative Humidity (%)	52

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

Test Technician(s): Donald Salguero

Test Date(s): June 4, 2019

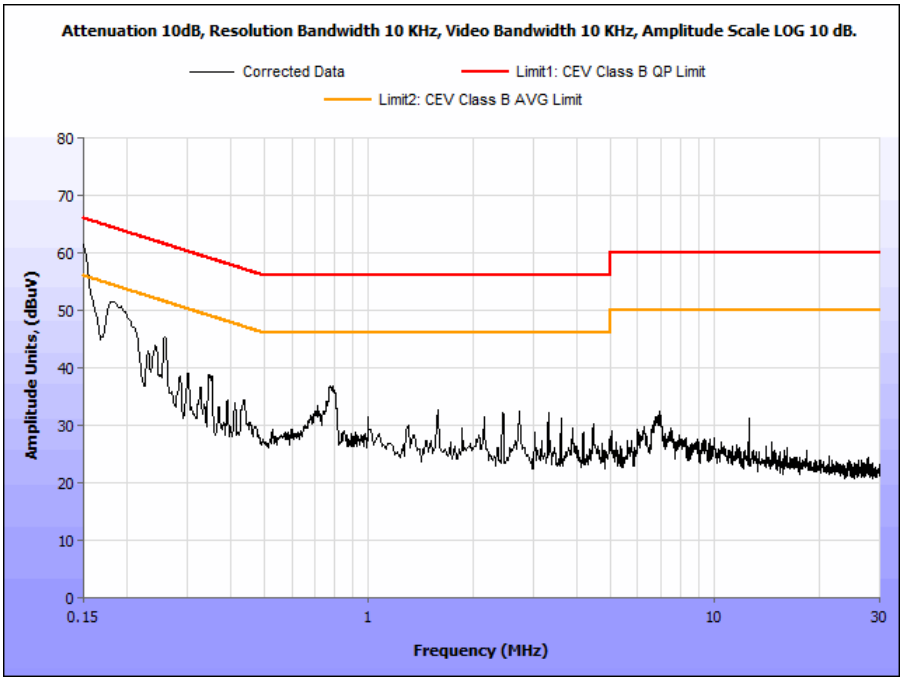
Conducted Emissions at the Mains Terminal Test Data:

Line Under Test:		Phase										
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	External Attenuation (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	External Attenuation (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.15	40.9	0	10	50.9	66	-15.1	20.83	0	10	30.83	56	-25.17
0.15425	41.03	0	10	51.03	65.77	-14.74	17.91	0	10	27.91	55.77	-27.86
0.184	36.26	0	10	46.26	64.3	-18.04	15.09	0	10	25.09	54.3	-29.21
0.25625	35.53	0	10	45.53	61.55	-16.02	9.12	0	10	19.12	51.55	-32.43
0.3455	19.46	0	10	29.46	59.07	-29.61	3.29	0	10	13.29	49.07	-35.78
0.7877	20.51	0	10	30.51	56	-25.49	7.22	0	10	17.22	46	-28.78

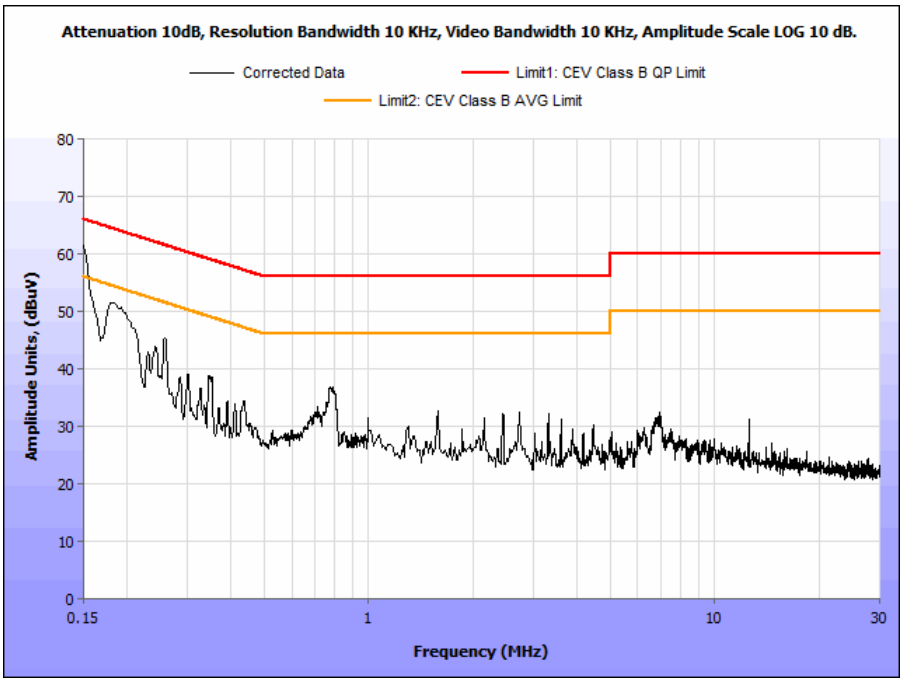
Table 9: Conducted Emissions at the Mains Terminal (120 VAC/60 Hz) Phase Test Results

Line Under Test:		Neutral										
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	External Attenuation (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	External Attenuation (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.18117	36.43	0	10	46.43	64.43	-18	14.25	0	10	24.25	54.43	-30.18
0.15	42.77	0	10	52.77	66	-13.23	20.82	0	10	30.82	56	-25.18
0.41435	15.27	0	10	25.27	57.56	-32.29	4.93	0	10	14.93	47.56	-32.63
0.2095	36.16	0	10	46.16	63.23	-17.07	11.77	0	10	21.77	53.23	-31.46
0.39225	26.29	0	10	36.29	58.02	-21.73	5.39	0	10	15.39	48.02	-32.63
0.5	12.99	0	10	22.99	56	-33.01	4.15	0	10	14.15	46	-31.85

Table 10: Conducted Emissions at the Mains Terminal (120 VAC/60 Hz) Neutral Test Results



Plot 1. Conducted Emission, Phase Line Plot



Plot 2. Conducted Emission, Phase Line Plot

Photograph 1: Conducted Emissions at the Mains Terminal Test Setup

3.2 Radiated Emission: Limits of Electromagnetic Radiation Disturbance

Test Method: **ANSI C63.4- American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz**

Test Standard: **Title 47 of the Code of Federal Regulations (CFR), Part 18 Subpart C**

Test Requirement(s): 18.305 Field strength limits:
(a) ISM equipment operating on a frequency specified in § 18.301 is permitted unlimited radiated energy in the band specified for that frequency.
(b) The field strength levels of emissions which lie outside the bands specified in § 18.301, unless otherwise indicated, shall not exceed the following:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25×SQRT(power/500)	300 [1]300
	Any non-ISM frequency	Below 500 500 or more	15 15×SQRT(power/500)	300 [1]300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 ([2])	1,600 ([2])
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F(kHz) 2,400/F(kHz)× SQRT(power/500)	300 [3]300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	24,000/F(kHz) 15	30 30
Induction cooking ranges	Below 90 kHz On or above 90 kHz	Any Any	1,500 300	[4]30 [4]30

[1] Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.
[2] Reduced to the greatest extent possible.
[3] Field strength may not exceed 10 μV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.
[4] Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

18.311 The measurement techniques which will be used by the FCC to determine compliance with the technical requirements of this part are set out in FCC Measurement Procedure MP–5, ‘‘Methods of Measurements of Radio Noise Emissions from ISM equipment’’. Although the procedures in MP–5 are not mandated, manufacturers are encouraged to follow the same techniques which will be used by the FCC.

Test Procedures: The EUT was placed on a non-metallic table, 80 cm above the ground plane (See Photograph 2 - 5) inside a semi-anechoic chamber. Measurements were made with a loop antenna.

Radiated Emission measurements were made in accordance with the general procedures of ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz" as well as the procedures delineated in FCC Measurement Procedure MP-5, “Methods of Measurements of Radio Noise Emissions from ISM equipment”.

For each point of measurement, the turntable was rotated, the positions of the interface cables were varied, and the antenna height was varied in order to find the maximum radiated emissions.
Measurements were made at 3m. The limit line was corrected for 3m using 40 Log($^{d1}/_{d2}$).

Environmental Conditions for Radiated Emissions	
Ambient Temperature (°C)	23.1
Relative Humidity (%)	59

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

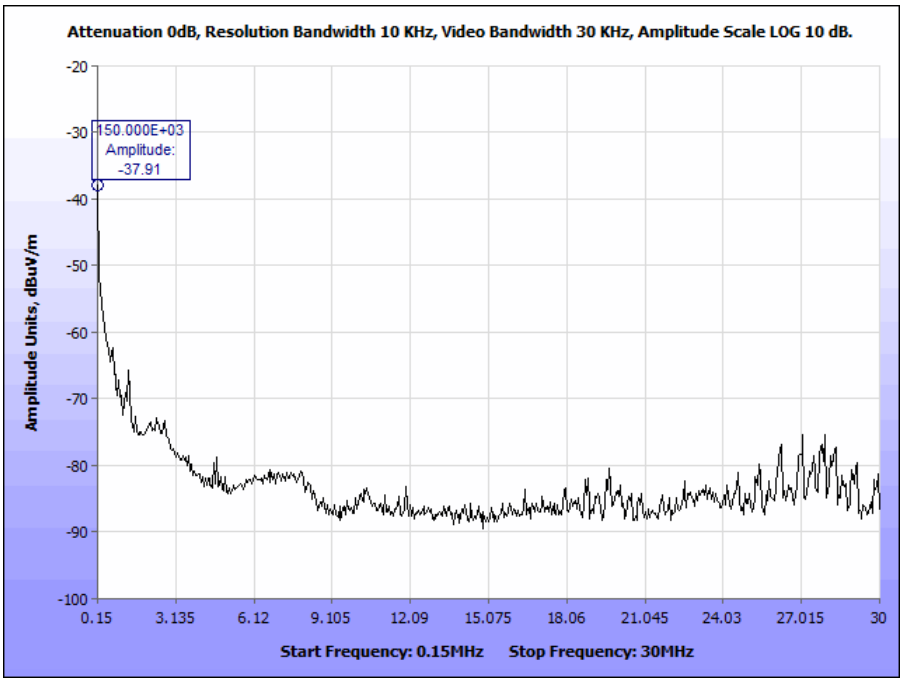
Test Technician(s): Donald Salguero

Test Date(s): May 22, 2019

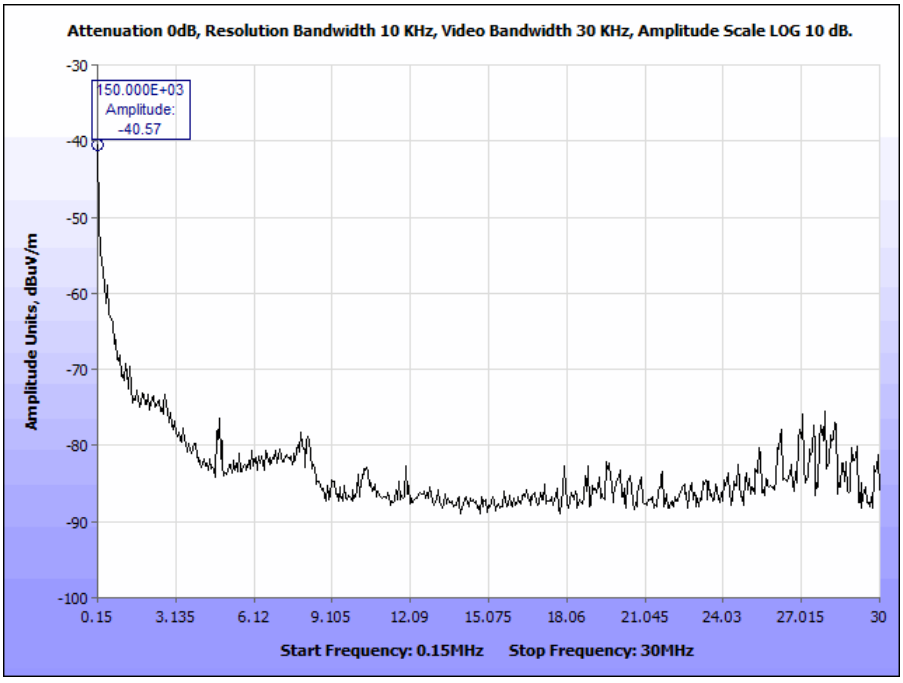
Radiated Emissions Limits Test Results:

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected EMI Meter Reading (dBuV)	Antenna Correction Factor (dB/m) (+)	Cable Loss (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30	360	v	1.0091	-1.38	26.5	0.75	0	25.87	40	-14.13
30	3.6	h	3.2252	1.32	26.5	0.75	0	28.57	40	-11.43
171.92	96.2	v	2.8256	3.98	16.25	1.89	0	22.12	43.5	-21.38
171.92	266.2	h	1.3482	2.04	16.25	1.89	0	20.18	43.5	-23.32
900	347.5	v	1.403	1.28	27.1	4.84	0	33.22	46	-12.78
900	60.2	h	1.3517	1.26	27.1	4.84	0	33.2	46	-12.8
800	85	v	1.0178	0.82	26.1	4.52	0	31.44	46	-14.56
800	12.5	h	1.4569	0.86	26.1	4.52	0	31.48	46	-14.52
700	301.3	v	1.2173	0.58	25	4.24	0	29.82	46	-16.18
700	345.8	h	1.0069	0.62	25	4.24	0	29.86	46	-16.14
600	52	v	1.0008	-0.2	23.7	3.79	0	27.29	46	-18.71
600	260	h	1.0047	-0.27	23.7	3.79	0	27.22	46	-18.78

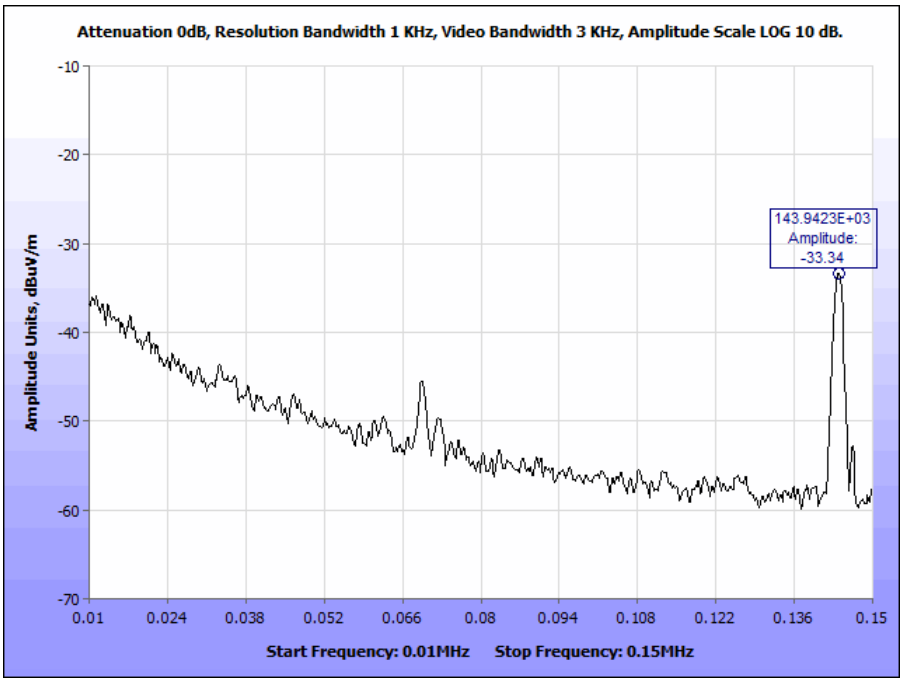
Table 11: Radiated Emissions Limits Test Results



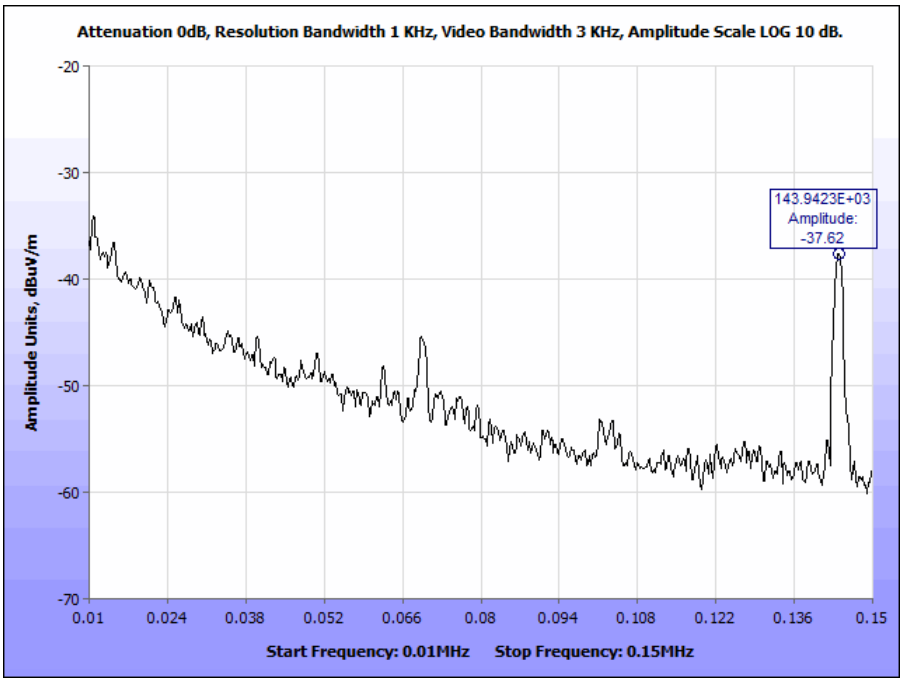
Plots 1. Radiated Emission – Powered On (0.150 - 30 MHz)



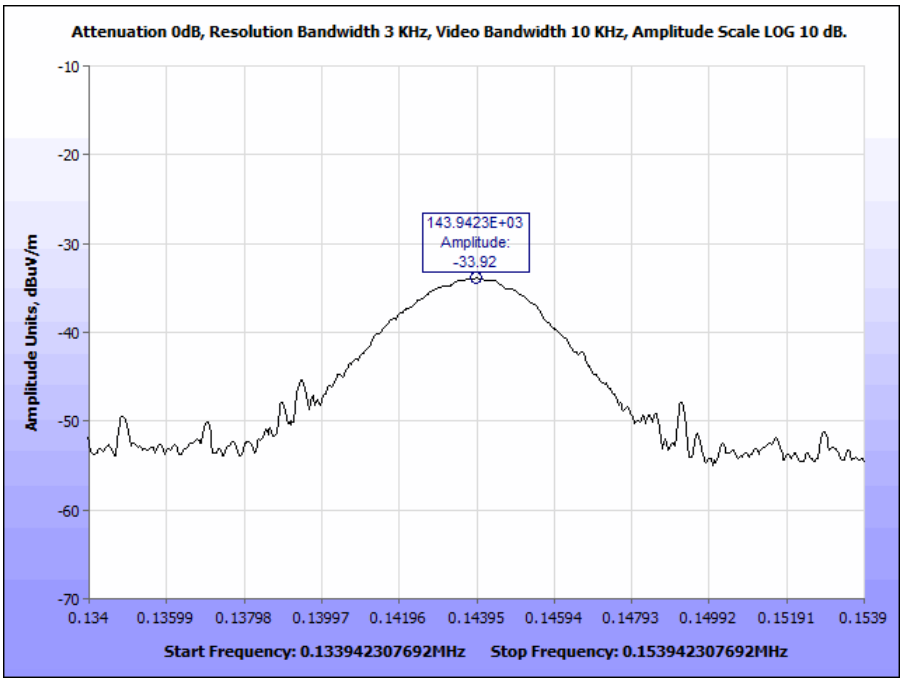
Plots 2. Radiated Emission – Powered On (0.150 - 30 MHz) – Perpendicular



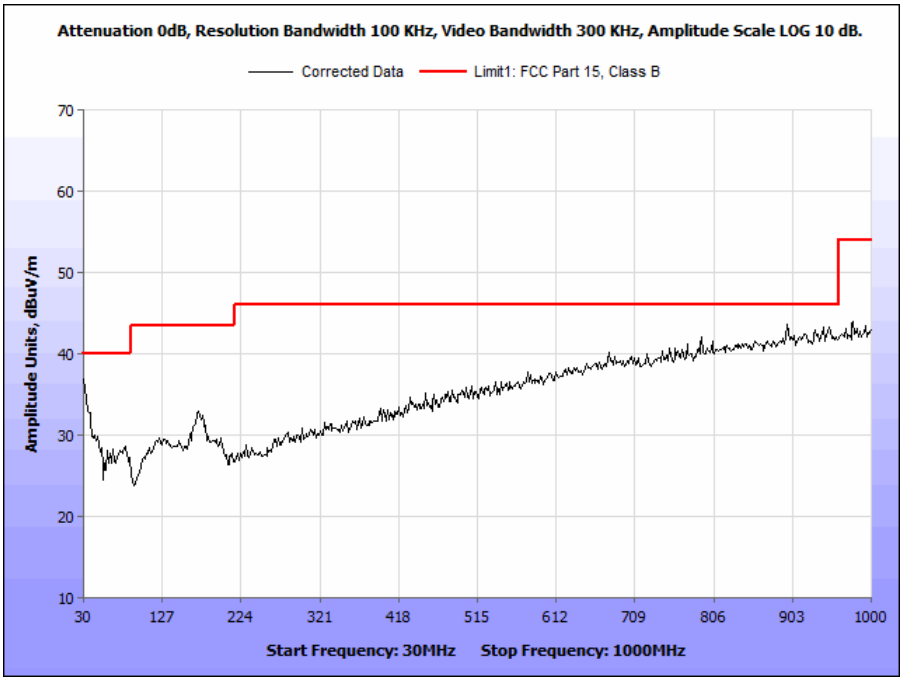
Plots 3. Radiated Emission – Powered On (30 – 150 kHz)



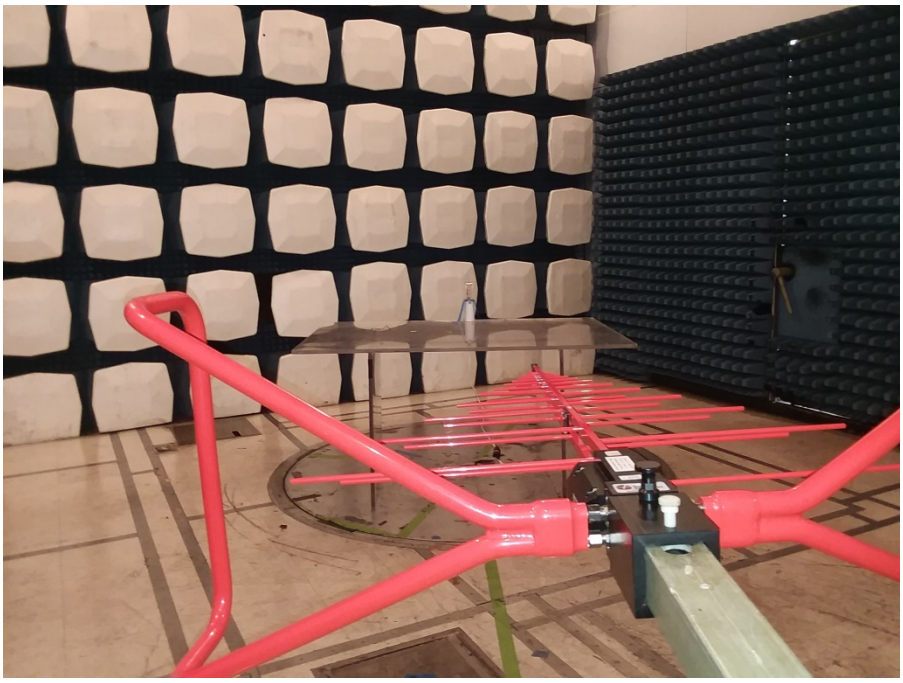
Plots 4. Radiated Emission – Powered On (30 – 150 kHz) - Perpendicular



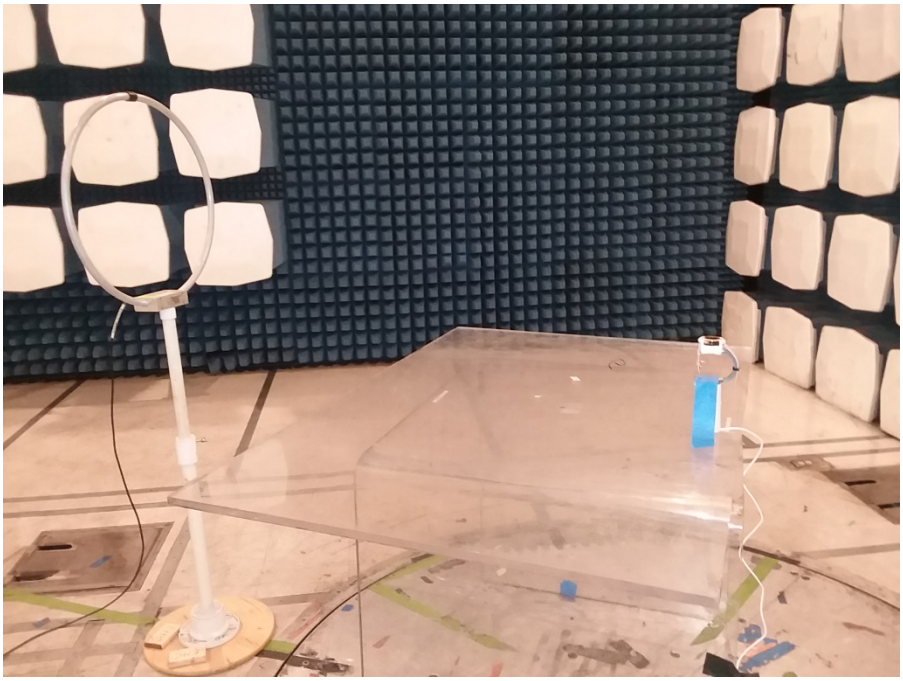
Plots 5. Radiated Emission – Powered On – Fundamental Emission



Plot 3. Radiated Emission, 30 – 1000 MHz, Class B, Test Setup



Photograph 2. Radiated Emissions, emissions between 30 MHz – 1 GHz



Photograph 3. Radiated Emissions, emissions between 9 kHz – 30 MHz

4.0 Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

Test Name: Conducted Emissions (AC Power)					**Test Date(s):** June 4, 2019
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4612	Spectrum Analyzer	Agilent Technologies	E4407B	5/15/2018	11/15/2019
1T7450	Transient Limiter	Com-Power	LIT-153A	Not Required	
1T2948	LISN	Solar Electronics Company	8028-50-TS-24-BNC	8/31/2018	2/29/2020
1T2947	LISN	Solar Electronics Company	8028-50-TS-24-BNC	8/31/2018	2/29/2020
1T4503	Shielded Room	Universal Shielding Corp	N/A	Not Required	
Test Name: Radiated Emissions					**Test Date(s):** May 22, 2019
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1S2501	EMI Test Receiver 20Hz-40GHz	Rohde & Schwarz	ESU40	3/26/2019	3/26/2020
1T4753	Antenna - Bilog	Sunol Sciences	JB6	8/30/2018	2/29/2020
1T4300	SEMI-ANECHOIC CHAMBER (NSA)	EMC TEST SYSTEMS	NONE	6/30/2018	6/30/2020
1T4800	Antenna, Loop	EMCO	6512	5/2/2019	11/2/2020
Note: Functionally verified test equipment is verified using calibrated instrumentation at the time of testing.					

Table 12: Test Equipment List