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April 3, 2020

Yank Technologies, Inc.
19 Morris Ave.
Brooklyn Navy Yard, Bldg. 128,
Brooklyn, NY 11205

Dear Josh Yank,

Enclosed is the EMC test report for limited compliance testing of the Yank Technologies, Inc., Motherbox, for a consumer devices (b), tested to the requirements of Title 47 of the CFR, Ch. 1, Subchapter A- Part 18 Subpart C for Industrial, Scientific, and Medical (ISM) Equipment.

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,

Joel Huna
Documentation Department
Eurofins E&E North America

Reference: (\Yank Technologies, Inc.\EMC105868-FCC18 Rev. 2)

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

A2LA ACCREDITED
TESTING CERT #0591.01

Electromagnetic Compatibility
Test Report

for

Yank Technologies, Inc.
Motherbox

Tested under

Title 47 of the CFR, Ch. 1, Subchapter A- Part 18 Subpart C for Industrial, Scientific, and Medical (ISM) Equipment

Report: EMC105868-FCC18 Rev. 2

April 3, 2020

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 C under normal use and maintenance.

Deepak Giri
Test Engineer, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	January 31, 2020	Initial Issue.
1	March 20, 2020	TCB Comments.
2	April 3, 2020	TCB Comments.

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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

Figure 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
§18.307 Conduction limits (b) all other part 18 consumer devices	Compliant	Measured emissions were within applicable limits.
§18.309 Frequency range of measurements (a) for field strength measurements	Compliant	Measured emissions were within applicable limits.

Figure 2: Testing Summary

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

2.0 Equipment Configuration

2.1 Overview

Eurofins E&E North America was contracted by Yank Technologies, Inc. to perform testing on the Motherbox, under Yank Technologies, Inc. purchase order number PO1005.

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

In accordance with §2.948, the following data is presented in support of the verification of the Yank Technologies, Inc., Motherbox. Yank Technologies, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Motherbox has been **permanently** discontinued, as per §2.955(b).

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

Model(s) Tested:	Motherbox
Model(s) Covered:	Motherbox
Primary Power as Tested:	120 VAC 60 Hz
Equipment Emissions Class:	B
Highest Clock Frequency:	6.78 MHz
Evaluated by:	Donald Salguero
Report Date:	March 20, 2020

Figure 3. EUT Overview

2.2 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, 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 Laboratories, Inc. 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 E&E North America.

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%

Figure 4. Uncertainty Calculations Summary

2.4 Description of Test Sample

The Motherbox is a wireless battery charger.

2.5 Equipment Configuration

The EUT was set up as outlined in Figure 8. All equipment incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Part Number	Serial Number	Revision
MB-1	MotherBox Unit	2AQ8NMB-1	Not provided	Not provided	1

Figure 5. Equipment Configuration

2.6 Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
20VCH-1	20V AC/DC Charger	IBM/Lenovo	92P1158	
	Dummy Load		**N/A**	
The 'Customer Calibration Data' Column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.				

Figure 6. Support Equipment

2.7 Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Max Length (m)	Shielded (Y/N)	Termination Point
1	**Data**	**RG59 Coax**	**1**	**15**		**Yes**	**B. TX**
2	**AC Input**	**3 conductor, 18 awg**	**1**	**2**		**No**	**(230v/50hz)**

Figure 7. Ports and Cabling Information

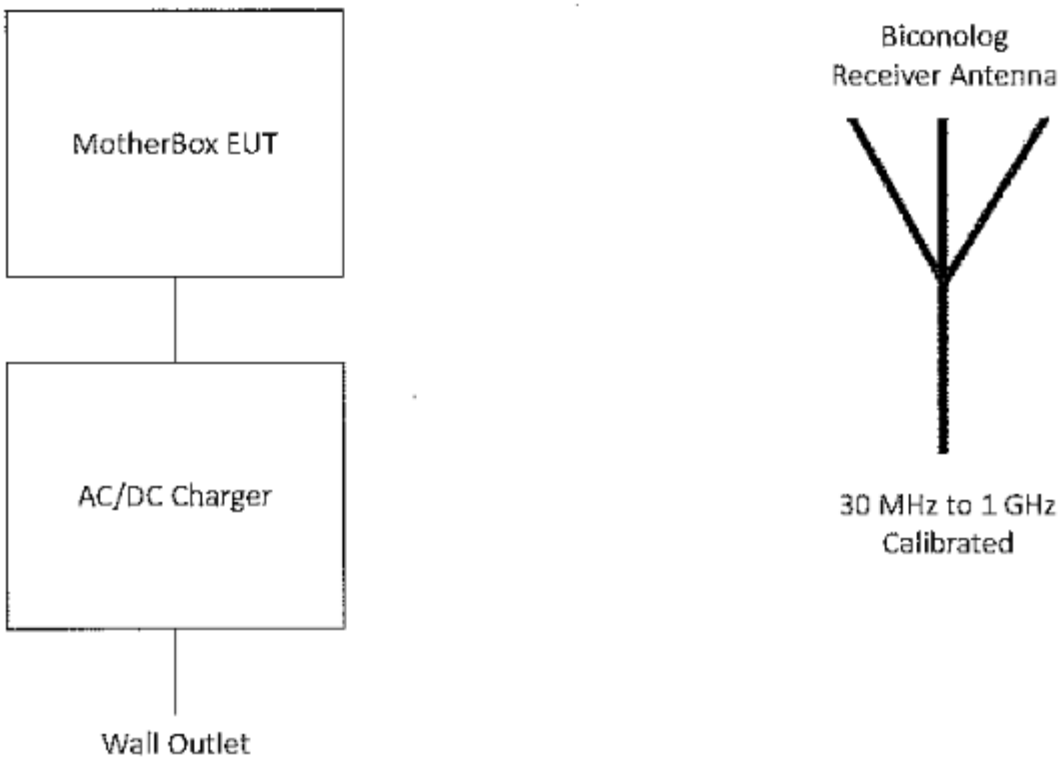

Figure 8. Block Diagram of Test Configuration

2.8 Mode of Operation

While the EUT is plugged into a power outlet, it can be on Standby or Operational. While in Standby, the unit is powered on, but no wireless power transfer is occurring. When unit is Operational, the wireless power transfer capabilities are enabled. The supplied sample (EUT) is an engineering unit set to continuously enable the power transfer function.

2.9 Method of Monitoring EUT Operation

There is temperature monitoring circuitry, a fuse to protect the supply, and monitoring circuitry to make sure the unit is performing effectively. If the unit is not performing correctly accordingly to the examination, then the frequency of operation will differ on a spectrum analyzer from at its fundamental frequency of 6.78 MHz.

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 Electromagnetic Compatibility Lab for testing was returned to Yank Technologies, Inc. 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(b) 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
* Decreases with the logarithm of the frequency		

Figure 9. Conducted Limits for ISM calculated from FCC Part 18 Section 18.307(b)

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’’.

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 MP-5 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. The fundamental frequency of the EUT falls below 30MHz, and the antenna is permanently attached. As a result, the antenna was removed and substituted with a suitable dummy load.

Test Results: The EUT was **compliant** with the requirements of this section. Measured emissions were within applicable limits.

Test Technician(s): Donald Salguero

Test Date(s): 01/14/2020

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
0.2152	29.9	0	10	39.9	63	-23.1	13.7	0	10	23.7	53	-29.3
0.15	38.47	0	10	48.47	66	-17.53	24.47	0	10	34.47	56	-21.53
0.1799	32.83	0	10	42.83	64.49	-21.66	15.52	0	10	25.52	54.49	-28.97
0.3688	19.87	0	10	29.87	58.53	-28.66	8.044	0	10	18.044	48.53	-30.486
1.035	11.09	0	10	21.09	56	-34.91	4.886	0	10	14.886	46	-31.114
6.782	14.19	0	10	24.19	60	-35.81	8.126	0	10	18.126	50	-31.874

Figure 10: 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
0.1936	34.36	0	10	44.36	63.88	-19.52	22.52	0	10	32.52	53.88	-21.36
0.15	42.68	0	10	52.68	66	-13.32	30.5	0	10	40.5	56	-15.5
0.392	25.65	0	10	35.65	58.02	-22.37	19.66	0	10	29.66	48.02	-18.36
0.7115	26.31	0	10	36.31	56	-19.69	20.02	0	10	30.02	46	-15.98
4.12	17.77	0	10	27.77	56	-28.23	11.58	0	10	21.58	46	-24.42
6.777	15.95	0	10	25.95	60	-34.05	12.58	0	10	22.58	50	-27.42

Figure 11: Conducted Emissions at the Mains Terminal (120 VAC/60 Hz) Neutral Test Results

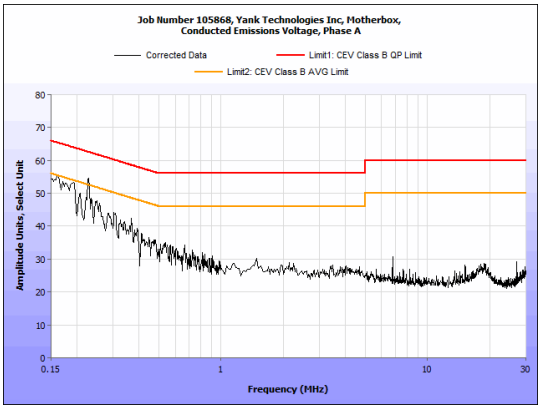

Figure 12: Conducted Emissions, phase, Dummy Load Terminated.

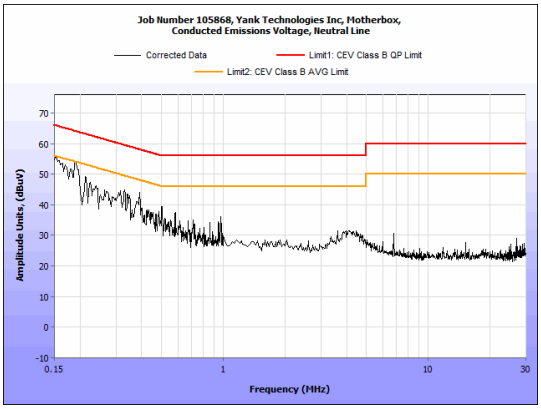

Figure 13: Conducted Emissions, neutral, Dummy Load Terminated.

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 inside a semi-anechoic chamber.

Measurements were made with a loop antenna for emissions between 10kHz and 30MHz at a 1m distance. A correction factor of 40*log(1/300) was added to the emissions in order to compare it to a 300m distance limit.

Measurements were done with a bilog antenna for emissions between 30MHz and 400MHz at a 3m distance. A correction factor of 20*log(3/300) was added to the emissions in order to compare it to a 300m distance limit.

Radiated Emission measurements were made in accordance with the general procedures of ANSI C63.4-2014 "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.

Test Results: The EUT was **compliant** with the requirements of this section. Measured emissions were within applicable limits.

Test Technician(s): Donald Salguero

Test Date(s): 01/14/2020

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/Pre-amp (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
162.75	215.4	V	2.1108	44.75	17.12	2.21	40	24.08	27.96	-3.88
176.3	220.2	V	2.0091	46.06	15.80	2.29	40	24.15	27.96	-3.81
61.05	155.9	V	1.0034	49.95	11.90	1.39	40	23.24	27.96	-4.72
61.05	155.9	V	1.0034	49.95	11.90	1.39	40	23.24	27.96	-4.72
*155.97	77.5	H	1.8052	46.15	17.50	2.17	40	25.82	27.96	-2.14
*162.76	258.5	H	1.6317	48.18	17.12	2.21	40	27.51	27.96	-0.45
176.3	245.7	H	1.8191	45.78	15.80	2.29	40	23.87	27.96	-4.09
176.3	245.7	H	1.8191	45.78	15.80	2.29	40	23.87	27.96	-4.09

Figure 14: Radiated Emissions Limits Test Results

Note 1: * - At this frequency, the measured electric-field strength exhibits a margin of compliance that is less than 3 dB below the specification limit. We recommend that every emission measured, have at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

Note 2: The following sample calculation was used to correct the amplitude (Corrected Amplitude (dBuV/m)= Uncorrected Data+ACF+Cable Loss-Distance Correction Factor).

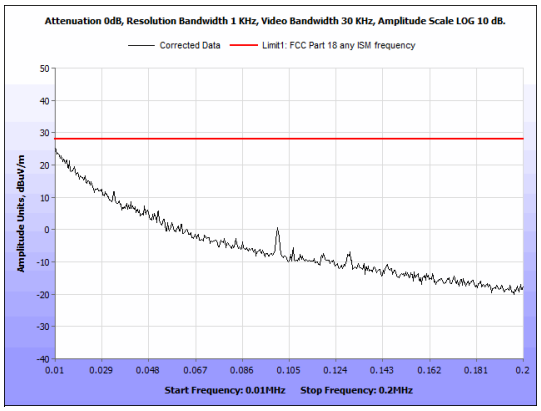

Figure 15: Radiated Emissions, 0.01-0.2 MHz, Cumulative

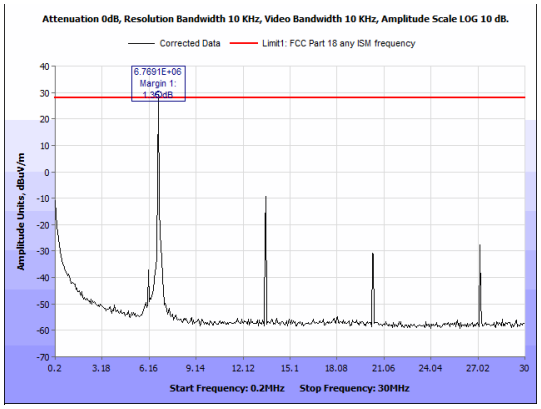

Figure 16: Radiated Emissions, 0.2-30 MHz, Parallel

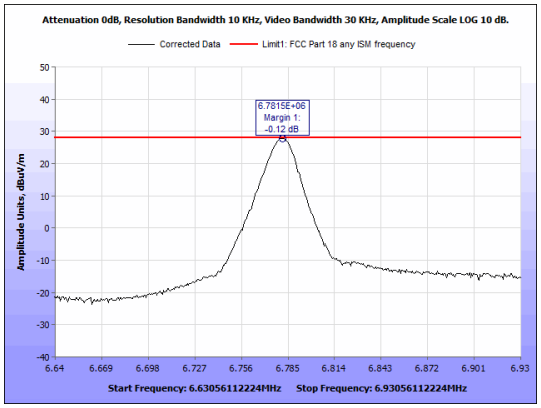

Figure 17: Radiated Emissions, Fundamental Emission, Parallel

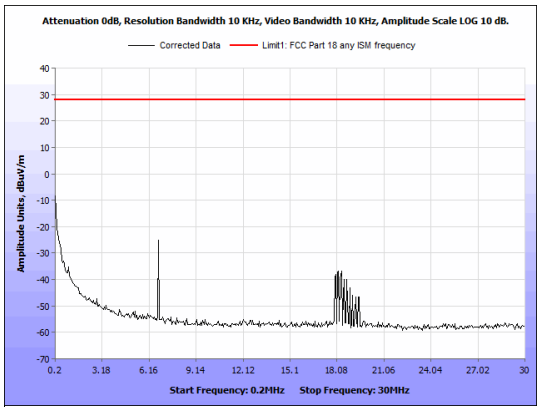

Figure 18: Radiated Emissions, 0.2-30 MHz, Parallel, standby

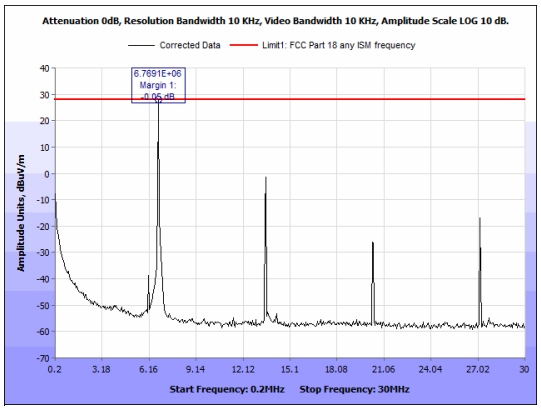

Figure 19: Radiated Emissions, 0.2-30 MHz, Perpendicular

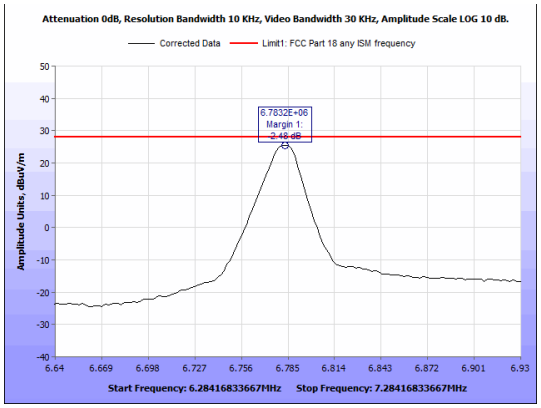

Figure 20: Radiated Emissions, Fundamental Emission, Perpendicular

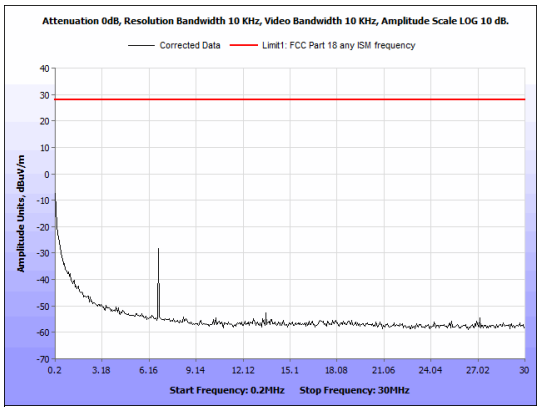

Figure 21: Radiated Emissions, 0.2-30 MHz, Perpendicular, standby

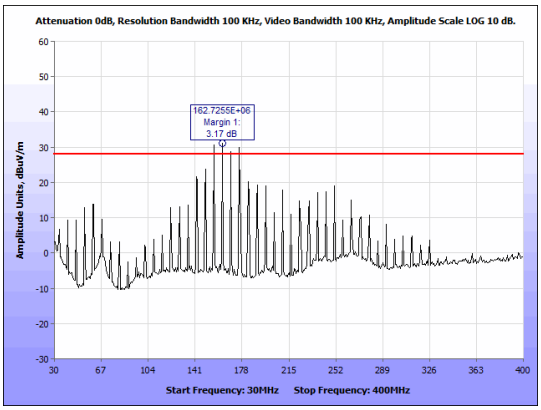

Figure 22: Radiated Emissions, 30-400 MHz, Horizontal

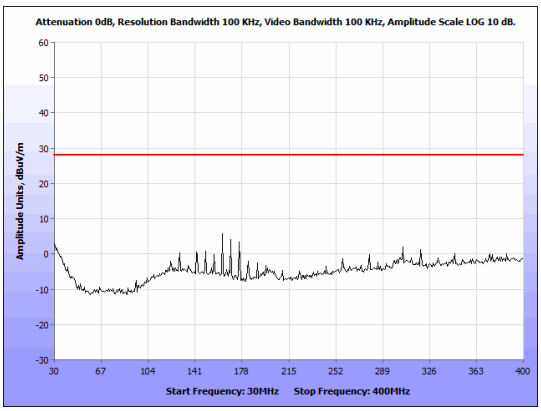

Figure 23: Radiated Emissions, 30-400 MHz, Horizontal, standby

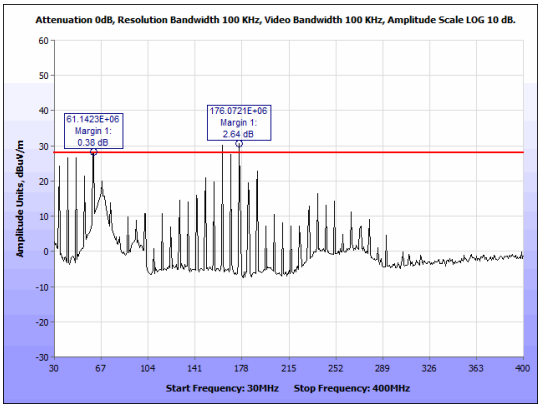

Figure 24: Radiated Emissions, 30-400 MHz, Vertical

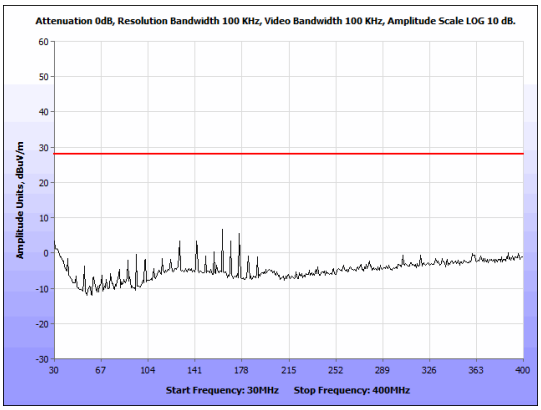

Figure 25: Radiated Emissions, 30-400 MHz, Vertical, standby

4.0 Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Test Name: Conducted Emissions (AC Power)				**Test Date(s):** 01/14/2020	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4829	Spectrum Analyzer	Agilent Technologies	E4407B	09/28/2018	03/28/2020
1T4565	LISN (24 AMP)	Solar Electronics Company	9252-50-R-24-BNC	04/03/2019	10/03/2020
1T4504	Shielded Room	Universal Shielding Corp	N/A	Not Required	
1T7450	Transient Limiter	Com-Power	LIT-153A	Not Required	
Test Name: Radiated Emissions				**Test Date(s):** 01/14/2020	
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4409	EMI Receiver	Rohde & Schwarz	ESIB7	01/04/2019	01/04/2021
1T4753	Antenna - Bilog	Sunol Sciences	JB6	08/30/2018	02/29/2020
1T4800	Antenna, Loop	EMCO	6512	05/02/2019	11/02/2020
Note: Functionally verified test equipment is verified using calibrated instrumentation at the time of testing.					

Figure 26: Test Equipment List