

WiBotic Inc.

REVISED TEST REPORT TO 103494-4

TR-301*

(*See Appendix A for Manufacturer Declaration)

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.249

Report No.: 103494-4A

Date of issue: July 13, 2020



Test Certificate # 803.01

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

WiBotic Inc.
9706 - 4th Ave. NE
Seattle, WA 98115

Representative: Patrick Vilbrandt
Customer Reference Number: 1220 Rev 2

DATE OF EQUIPMENT RECEIPT:**DATE(S) OF TESTING:****REPORT PREPARED BY:**

Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 103494

May 8, 2020

May 8-11, 2020 and June 3, 2020

Revision History

Original: Testing of the TR-301 to FCC Part 15 Subpart C Section(s) 15.207 & 15.249.

Revision A: To update the Equipment Type to Stand-alone in the General Product table.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Canyon Park, Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.12

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Japan
Canyon Park, Bothell, WA	US0081	US1022	A-0136
Brea, CA	US0060	US1025	A-0136
Fremont, CA	US0082	US1023	A-0136
Mariposa, CA	US0103	US1024	A-0136

*CKC's list of NIST designated countries can be found at: <https://standards.gov/cabs/designations.html>

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.249 and 15.207

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	NA	Pass
15.249(a)	Field Strength of Fundamental	NA	Pass
15.249(a)	Radiated Emissions and Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions

No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions

None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
TR-301-AC-ST	WiBotic Inc.	TR-301*	010

* See Appendix A for Manufacturer Declaration

Support Equipment:

Device	Manufacturer	Model #	S/N
MacBook Pro	Apple	A1398	NA
TC-200-HP-ST	WiBotic Inc.	TC-200	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone
Modulation Type(s):	GFSK 250kbps
Maximum Duty Cycle:	100%
Antenna Type(s) and Gain:	Chip antenna 1dBi
Antenna Connection Type:	Integral
Nominal Input Voltage:	115V/60Hz
Firmware / Software used for Test:	V11.1

EUT Photo(s)

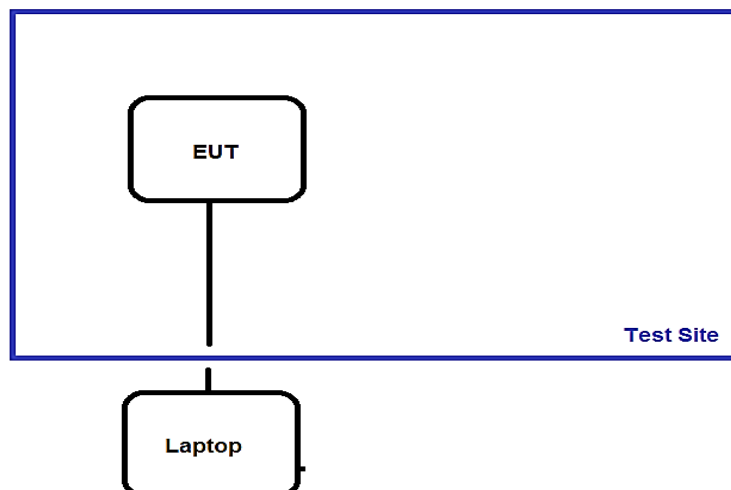


Support Equipment Photo(s)



Block Diagram of Test Setup(s)

Test Setup Block Diagram



FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	S. Pittsford
Test Method:	ANSI C63.10 (2013)	Test Date(s):	5/8/2020
Configuration:	1		
Test Setup:	Continuously transmitting all 0 data EUT is located on test bench 1.5m high. EUT is investigated in X, Y & Z axis Vertical and horizontal with worst case reported. EUT is connected to a support laptop outside the test chamber via unshielded CAT 5e. Wireless power is turned off.		

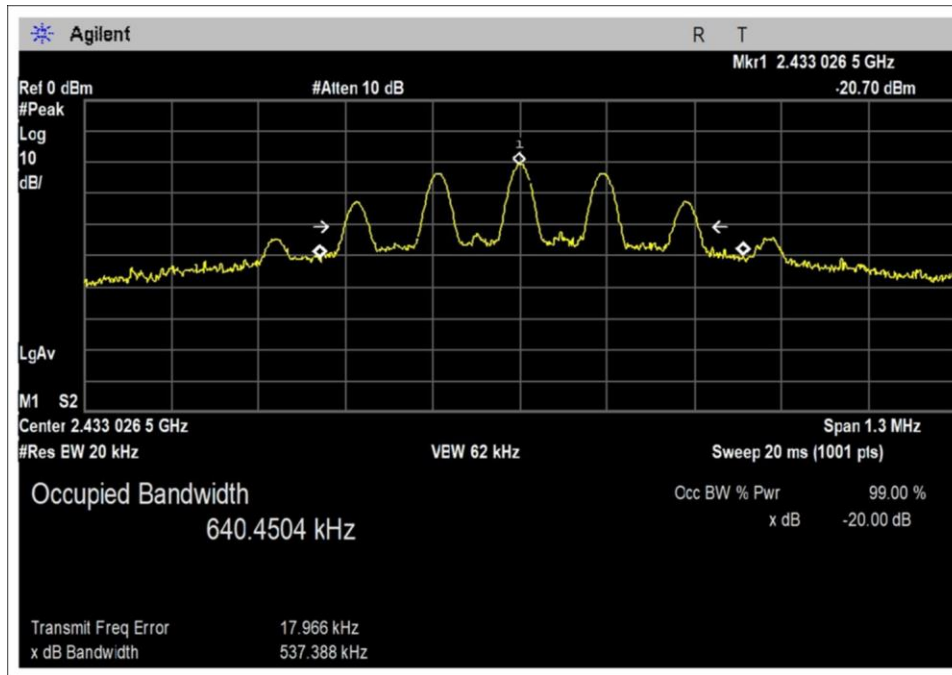
Environmental Conditions			
Temperature (°C)	23	Relative Humidity (%):	32

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
01467	Horn Antenna	EMCO	3115	7/5/2019	7/5/2021
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021
P06515	Cable	Andrews	Heliast	6/29/2018	6/29/2020
P06540	Cable	Andrews	Heliast	8/23/2019	8/23/2021
03540	Preamplifier	HP	83017A	5/13/2019	5/13/2021
P07504	Cable	TMS	CLU40-KMKM-02.00F	1/17/2019	1/17/2021

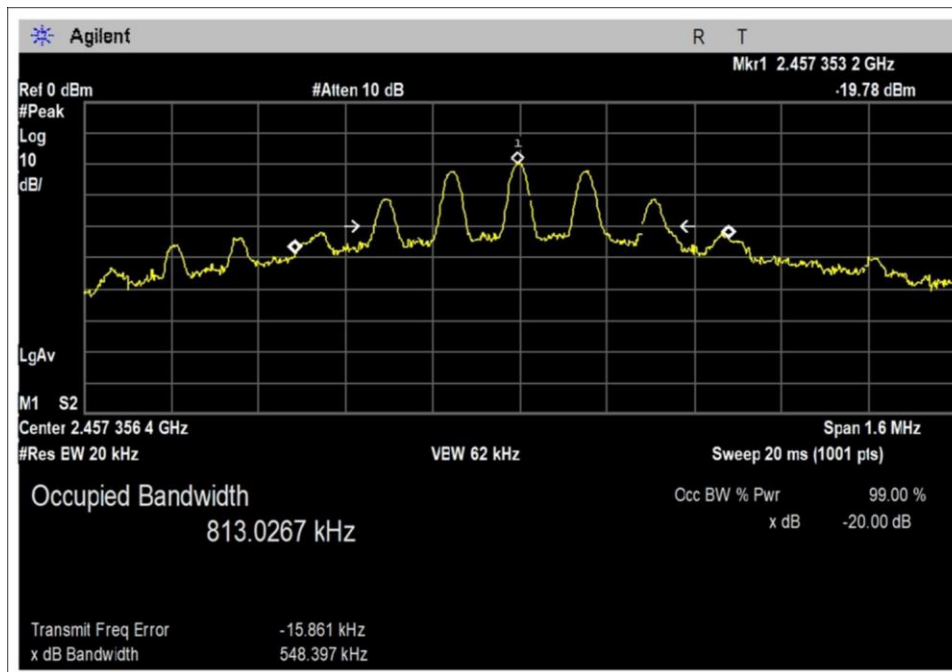
Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
2433.03	1	GSFK	537.4	None	NA
2457.36	1	GSFK	548.4	None	NA
2481.68	1	GSFK	539.5	None	NA

NA = Not applicable, because FCC 15.215 does not give any limits so there is no criteria for pass or fail.

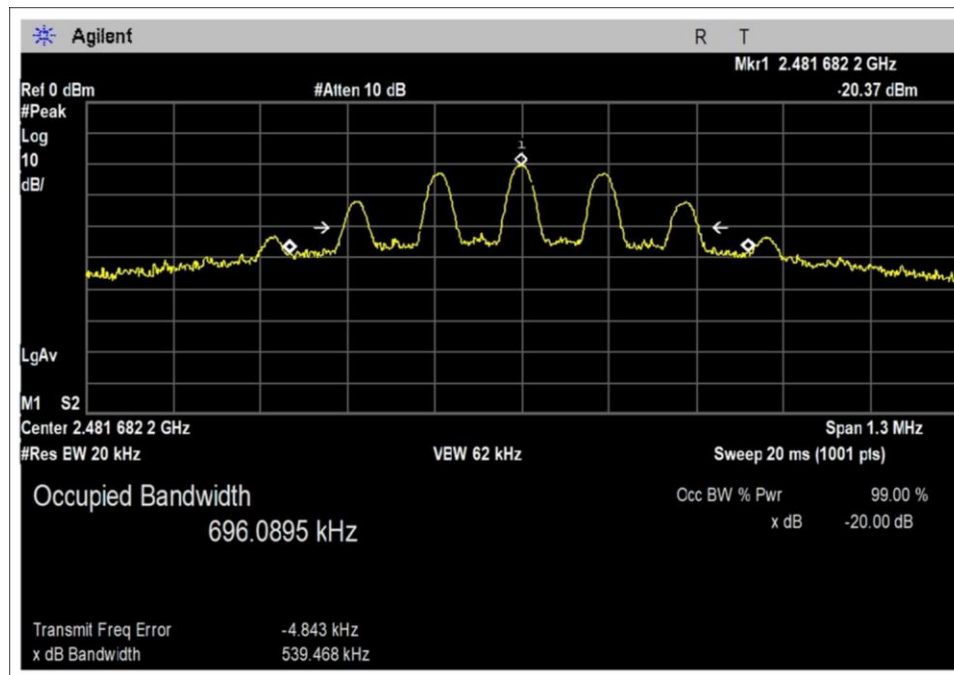
Plot(s)



Low Channel



Middle Channel



High Channel

Test Setup Photo(s)



15.249(a) Field Strength of Fundamental

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	V _{Minimum} (dBuV/m)	V _{Nominal} (dBuV/m)	V _{Maximum} (dBuV/m)	Max Deviation from V _{Nominal} (dB)
2433.03	GFSK Integral	86.8	86.8	86.8	0.0
2457.36	GFSK Integral	88.2	88.2	88.2	0.0
2481.68	GFSK Integral	87.8	87.8	87.8	0.0

Test performed using operational mode with the highest output power, representing worst case.

Parameter Definitions:

Measurements performed at input voltage V_{Nominal} ± 15%.

Parameter	Value
V _{Nominal} :	120 VAC
V _{Minimum} :	102.00 VAC
V _{Maximum} :	138.00 VAC

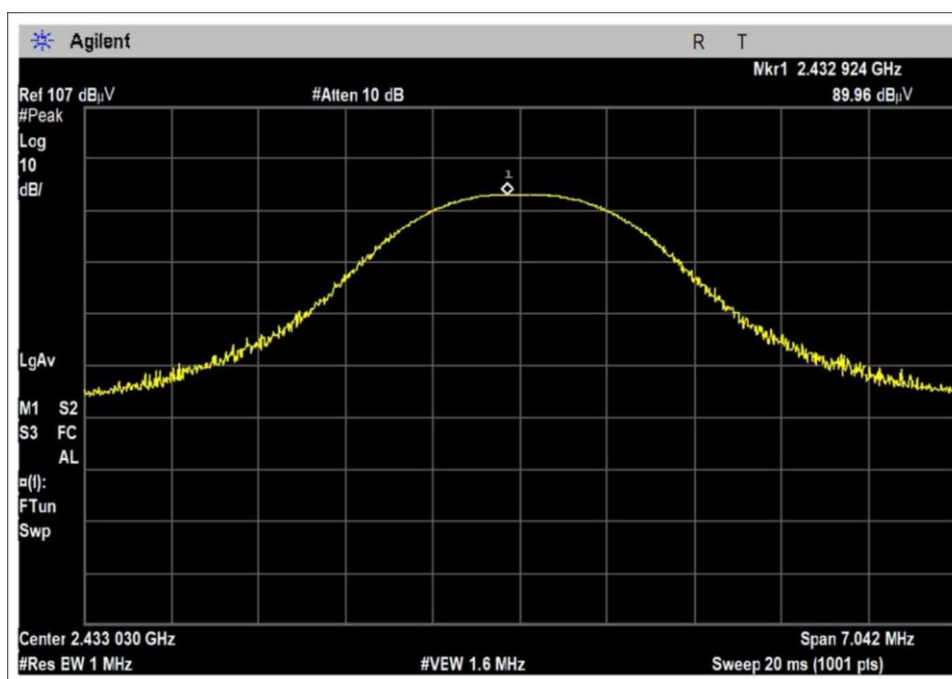
Test Data Summary – Radiated Field Strength Measurement					
Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 3m)	Limit (dBuV/m @ 3m)	Results
2433.03	GFSK	Integral	86.8	≤94	Pass
2457.36	GFSK	Integral	88.2	≤94	Pass
2481.68	GFSK	Integral	87.8	≤94	Pass

Plots shows raw reading please see datasheet for corrected readings.

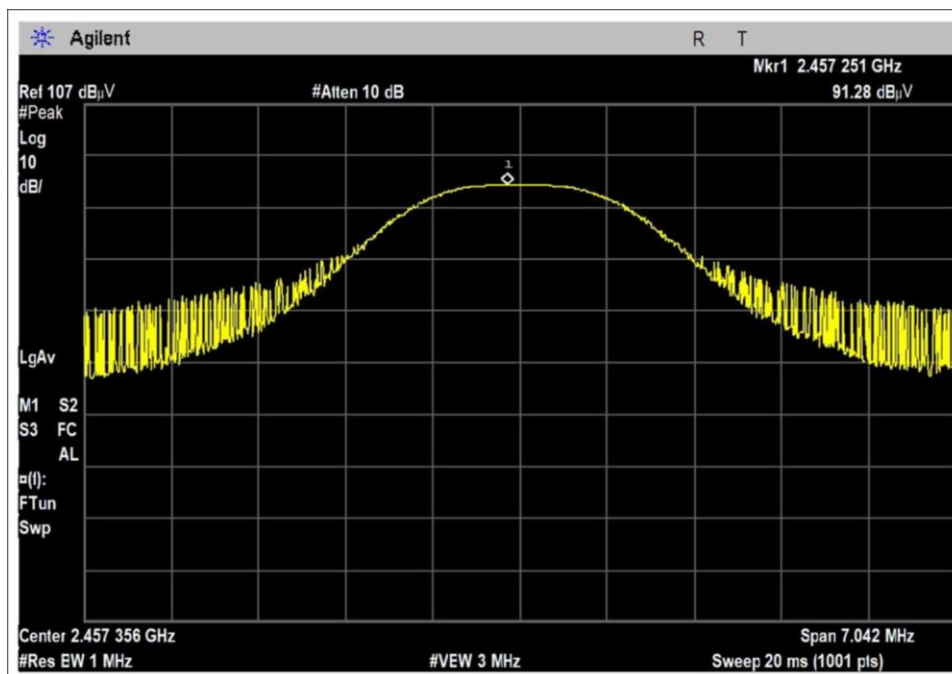
No change in reading during voltage variations.

50mV/m = 94dBuV/m

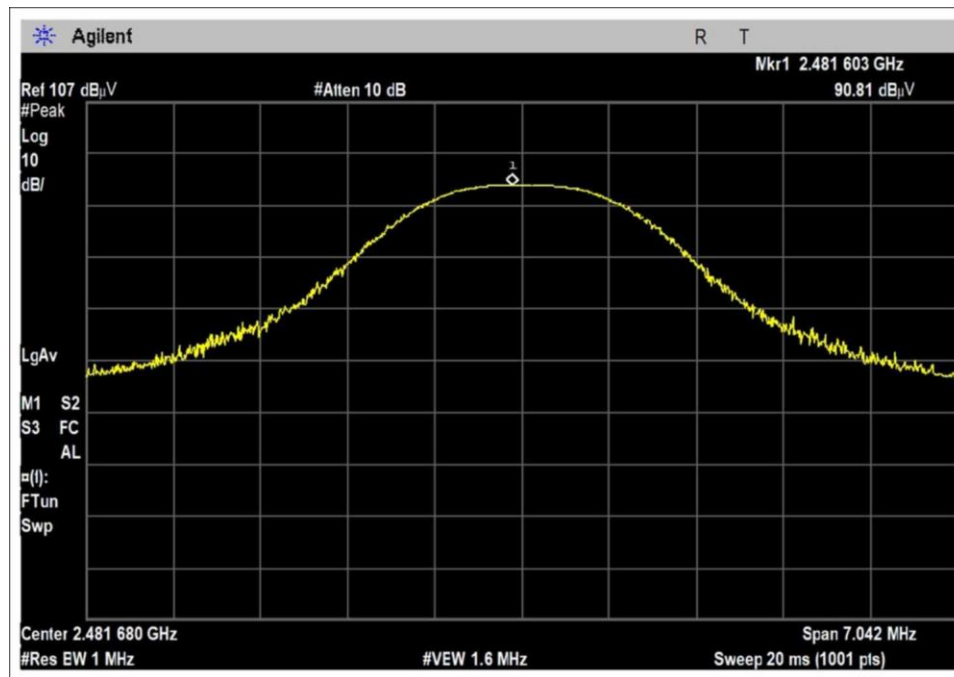
Plot(s)



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location: **CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98201 • 435-402-1717**
 Customer: **WiBotic Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
 Work Order #: **103494** Date: 5/8/2020
 Test Type: **Maximized Emissions** Time: 09:58:41
 Tested By: Steven Pittsford Sequence#: 32
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

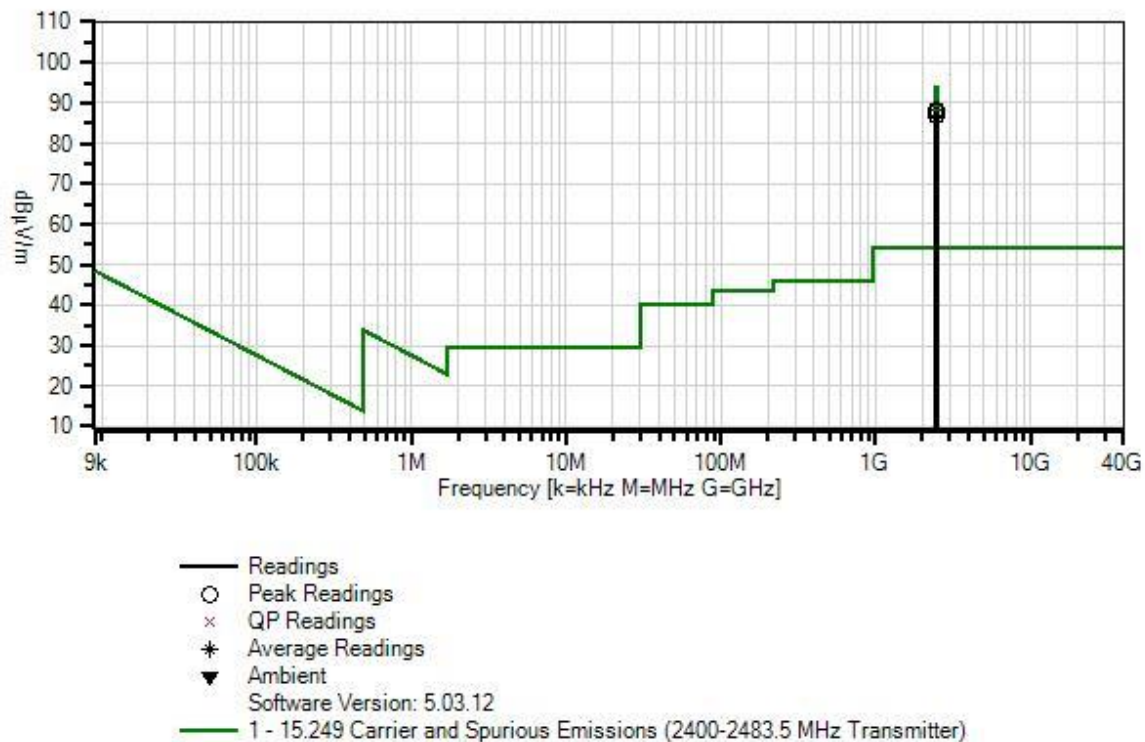
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23°C Pressure: 102.3kPa Humidity: 33% Frequency tested: 2.433, & 2.4817GHz Firmware power setting: Max Power Duty Cycle: 100% Test Method: ANSI C63.10 (2013) Test Mode: Continuously transmitting all 0 data Test Setup: EUT is located on test bench 1.5m high. EUT is investigated in X, Y & Z axis Vertical and horizontal with worst case reported. EUT is connected to a support laptop outside the test chamber via unshielded CAT 5e. Wireless power is turned off.

WiBotic Inc. WO#: 103494 Sequence#: 32 Date: 5/8/2020
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T2	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T3	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T4	ANP06515	Cable	Heliac	6/29/2018	6/29/2020
T5	ANP07504	Cable	CLU40-KMKM-02.00F	1/17/2019	1/17/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	2457.251M	91.3	+0.6 +0.3	-34.3	+27.6	+2.7	+0.0 343	88.2	94.0	-5.8	Vert 150
2	2481.603M	90.8	+0.6 +0.3	-34.2	+27.6	+2.7	+0.0 342	87.8	94.0	-6.2	Vert 147
3	2432.924M	90.0	+0.6 +0.3	-34.3	+27.6	+2.6	+0.0 341	86.8	94.0	-7.2	Vert 152

Test Setup Photo(s)



Test Setup



X Axis



Y Axis



Z Axis

15.249(a) Radiated Emissions and Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98201 • 435-402-1717
 Customer: **WiBotic Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
 Work Order #: **103494** Date: 5/11/2020
 Test Type: **Maximized Emissions** Time: 06:24:21
 Tested By: Steven Pittsford Sequence#: 32
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 9kHz-25GHz
 Frequency tested: 2.433, 2457.4 & 2.4817GHz
 Firmware power setting: Max Power

Duty Cycle: 100%

Test Method: ANSI C63.10 (2013)
 Test Mode: Continuously transmitting
 Test Setup: EUT is located on test bench 0.8m high <1GHz and 1.5m high >1GHz.
 EUT is investigated in X, Y & Z axis Vertical and horizontal with worst case reported.
 EUT is connected to a support laptop outside the test chamber via unshielded CAT 5e.
 Wireless power is turned off.

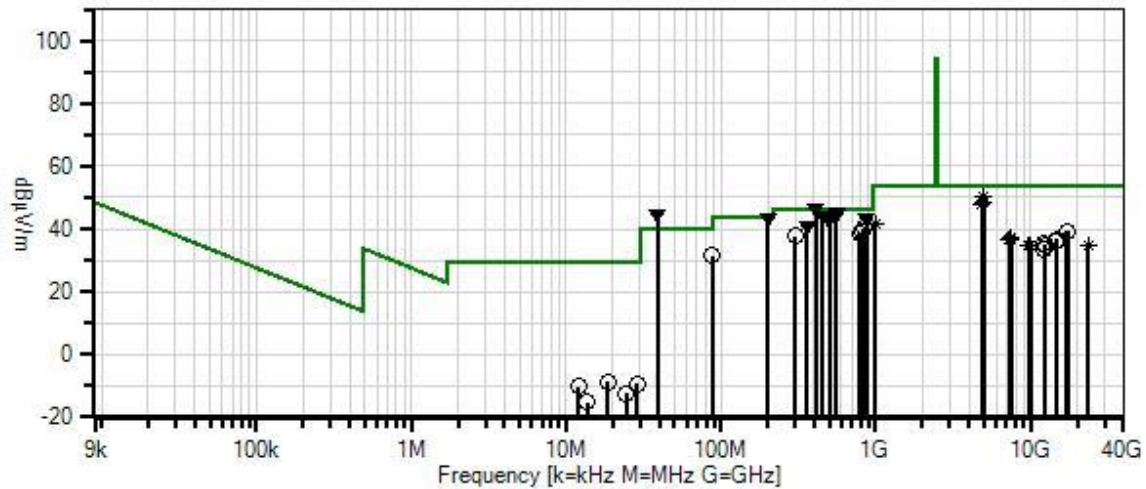
3 x orthogonal axes investigated below 30MHz, Vertical and Horizontal axes investigated above 30MHz, worst case reported.

Emissions unrelated to radio function marked as ambient. With radio turned off there are emissions caused by the digital circuitry that do not meet the 15.249 limit, but they should not be counted because 15.249 is only applicable to transmitter related circuitry, those emissions should fall under the 15.109 class A limit and are to be ignored against this limit.

The manufacturer declares: All other ports are for maintenance only.

Temperature (°C): 22-24
 Relative Humidity (%): 0-35

WiBotic Inc. WO#: 103494 Sequence#: 32 Date: 5/11/2020
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Vert



- Readings
- Peak Readings
- × QP Readings
- * Average Readings
- ▼ Ambient
- Software Version: 5.03.12
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Cal Date	Cal Due Date
T1	ANP06540	Cable	Helix	8/23/2019	8/23/2021
T2	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T3	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T5	ANP06515	Cable	Helix	6/29/2018	6/29/2020
T6	ANP07504	Cable	CLU40-KMKM-02.00F	1/17/2019	1/17/2021
T7	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	4/26/2019	4/26/2021
T8	ANP06678	Cable	32026-29801-29801-144	2/20/2020	2/20/2022
T9	ANP07211	Cable	32026-29801-29801-18	8/7/2019	8/7/2021
T10	ANP07212	Cable	32026-29801-29801-18	8/7/2019	8/7/2021
T11	AN02763-69	Waveguide	Multiple	4/28/2020	4/28/2022
T12	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T13	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T14	AN02307	Preamp	8447D	1/10/2020	1/10/2022
T15	ANP05360	Cable	RG214	2/3/2020	2/3/2022
T16	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T17	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T18	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9 T13 T17	T2 T6 T10 T14 T18	T3 T7 T11 T15	T4 T8 T12 T16	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	38.700M Ambient	53.7	+0.1 +0.0 +0.0 +0.3 +12.7	+0.0 +0.0 +0.0 -28.0 +0.0	+0.0 +0.0 +0.0 +0.3	+0.0 +0.0 +0.0 +5.8	+0.0	44.9	40.0	+4.9	Vert
2	408.300M Ambient	48.2	+0.2 +0.0 +0.0 +1.0 +17.6	+0.0 +0.0 +0.0 -27.7 +0.0	+0.0 +0.0 +0.0 +1.3	+0.0 +0.0 +0.0 +5.8	+0.0	46.4	46.0	+0.4	Vert
3	199.996M Ambient	53.2	+0.2 +0.0 +0.0 +0.7 +9.8	+0.0 +0.0 +0.0 -27.2 +0.0	+0.0 +0.0 +0.0 +0.9	+0.0 +0.0 +0.0 +5.8	+0.0	43.4	43.5	-0.1	Vert
4	551.900M Ambient	44.9	+0.3 +0.0 +0.0 +1.1 +19.8	+0.0 +0.0 +0.0 -28.2 +0.0	+0.0 +0.0 +0.0 +1.6	+0.0 +0.0 +0.0 +5.8	+0.0	45.3	46.0	-0.7	Vert

5	551.986M Ambient	44.3	+0.3 +0.0 +0.0 +1.1 +19.8	+0.0 +0.0 +0.0 -28.2 +0.0	+0.0 +0.0 +0.0 +1.6 +5.8	+0.0 +0.0 +0.0 +0.0 +0.0	44.7	46.0	-1.3	Vert
6	455.800M Ambient	45.5	+0.2 +0.0 +0.0 +1.0 +18.1	+0.0 +0.0 +0.0 -27.9 +0.0	+0.0 +0.0 +0.0 +1.4 +5.8	+0.0 +0.0 +0.0 +0.0 +0.0	44.1	46.0	-1.9	Vert
7	874.900M Ambient	37.7	+0.3 +0.0 +0.0 +1.4 +23.8	+0.0 +0.0 +0.0 -27.4 +0.0	+0.0 +0.0 +0.0 +2.0 +5.8	+0.0 +0.0 +0.0 +0.0 +0.0	43.6	46.0	-2.4	Vert
8	500.400M Ambient	43.5	+0.3 +0.0 +0.0 +1.1 +18.5	+0.0 +0.0 +0.0 -28.1 +0.0	+0.0 +0.0 +0.0 +1.5 +5.8	+0.0 +0.0 +0.0 +0.0 +0.0	42.6	46.0	-3.4	Vert
9	4914.690M Ave	45.8	+0.9 +4.2 +0.0 +0.0 +0.0	+0.0 +0.5 +0.0 +0.0 +0.0	-33.6 +0.0 +0.0 +0.0 +0.0	+32.6 +0.0 +0.0 +0.0 +0.0	+0.0 331	50.4 Mid	54.0 -3.6	Horiz 163
^	4914.690M	49.9	+0.9 +4.2 +0.0 +0.0 +0.0	+0.0 +0.5 +0.0 +0.0 +0.0	-33.6 +0.0 +0.0 +0.0 +0.0	+32.6 +0.0 +0.0 +0.0 +0.0	+0.0 331	54.5 Mid	54.0 +0.5	Horiz 163
11	359.800M Ambient	44.3	+0.2 +0.0 +0.0 +0.9 +15.9	+0.0 +0.0 +0.0 -27.3 +0.0	+0.0 +0.0 +0.0 +1.2 +5.8	+0.0 +0.0 +0.0 +0.0 +0.0	41.0	46.0	-5.0	Vert
12	4963.466M Ave	43.9	+0.9 +4.2 +0.0 +0.0 +0.0	+0.0 +0.4 +0.0 +0.0 +0.0	-33.6 +0.0 +0.0 +0.0 +0.0	+32.6 +0.0 +0.0 +0.0 +0.0	+0.0 331	48.4 High	54.0 -5.6	Horiz 180
^	4963.466M	49.8	+0.9 +4.2 +0.0 +0.0 +0.0	+0.0 +0.4 +0.0 +0.0 +0.0	-33.6 +0.0 +0.0 +0.0 +0.0	+32.6 +0.0 +0.0 +0.0 +0.0	+0.0 331	54.3 High	54.0 +0.3	Horiz 180
14	840.000M	34.4	+0.3 +0.0 +0.0 +1.4 +23.7	+0.0 +0.0 +0.0 -27.5 +0.0	+0.0 +0.0 +0.0 +2.0 +5.8	+0.0 +0.0 +0.0 +0.0 +0.0	40.1	46.0	-5.9	Vert

15	4866.321M Ave	43.5	+0.9 +4.1 +0.0 +0.0 +0.0	+0.0 +0.5 +0.0 +0.0 +0.0	-33.6 +0.0 +0.0 +0.0 +0.0	+32.5 +0.0 +0.0 +0.0 +0.0	+0.0 322	47.9	54.0 Low	-6.1	Horiz 148
^	4866.321M	49.6	+0.9 +4.1 +0.0 +0.0 +0.0	+0.0 +0.5 +0.0 +0.0 +0.0	-33.6 +0.0 +0.0 +0.0 +0.0	+32.5 +0.0 +0.0 +0.0 +0.0	+0.0 356	54.0	54.0 Low	+0.0	Horiz 148
17	813.800M	33.3	+0.3 +0.0 +0.0 +1.4 +23.7	+0.0 +0.0 +0.0 -27.6 +0.0	+0.0 +0.0 +0.0 +1.9 +5.8	+0.0 +0.0 +0.0 +5.8 +5.8	+0.0	38.8	46.0	-7.2	Vert
18	791.500M	32.9	+0.3 +0.0 +0.0 +1.4 +23.6	+0.0 +0.0 +0.0 -27.7 +0.0	+0.0 +0.0 +0.0 +1.9 +5.8	+0.0 +0.0 +0.0 +5.8 +5.8	+0.0	38.2	46.0	-7.8	Vert
19	299.700M	43.7	+0.2 +0.0 +0.0 +0.9 +13.1	+0.0 +0.0 +0.0 -27.1 +0.0	+0.0 +0.0 +0.0 +1.1 +5.8	+0.0 +0.0 +0.0 +5.8 +5.8	+0.0	37.7	46.0	-8.3	Vert
20	87.200M	45.4	+0.1 +0.0 +0.0 +0.4 +7.0	+0.0 +0.0 +0.0 -27.8 +0.0	+0.0 +0.0 +0.0 +0.5 +5.8	+0.0 +0.0 +0.0 +5.8 +5.8	+0.0	31.4	40.0	-8.6	Vert
21	1000.000M Ave	51.9	+0.4 +1.8 +0.0 +0.0 +0.0	+0.0 +0.1 +0.0 +0.0 +0.0	-37.2 +0.0 +0.0 +0.0 +0.0	+24.3 +0.0 +0.0 +0.0 +0.0	+0.0 360	41.3	54.0	-12.7	Vert 148
^	1000.000M	57.7	+0.4 +1.8 +0.0 +0.0 +0.0	+0.0 +0.1 +0.0 +0.0 +0.0	-37.2 +0.0 +0.0 +0.0 +0.0	+24.3 +0.0 +0.0 +0.0 +0.0	+0.0 60	47.1	54.0	-6.9	Vert 148
23	17032.285 M	39.6	+2.1 +9.1 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 -11.4 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0	39.4	54.0 Low	-14.6	Vert 121
24	17372.320 M	40.2	+1.8 +8.6 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 -11.2 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0	39.4	54.0 High	-14.6	Vert 99

25	17199.580 M	40.2	+1.9 +8.8 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 -11.6 +0.0 +0.0	+0.0 +0.0	+0.0	39.3	54.0	-14.7	Vert 121
26	7445.226M Ave	27.3	+1.6 +5.5 +0.0 +0.0 +0.0	+0.0 +0.3 +0.0 +0.0 +0.0	-34.7 +0.0 +0.0 +0.0	+37.2 +0.0 +0.0	+0.0	37.2	54.0	-16.8	Vert 167
^	7445.226M	38.1	+1.6 +5.5 +0.0 +0.0 +0.0	+0.0 +0.3 +0.0 +0.0 +0.0	-34.7 +0.0 +0.0 +0.0	+37.2 +0.0 +0.0	+0.0 331	48.0	54.0	-6.0	Vert 180
28	14890.560 M	41.1	+1.7 +8.5 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 -14.4 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	36.9	54.0	-17.1	Vert 99
29	7374.255M Ave	27.0	+1.4 +5.4 +0.0 +0.0 +0.0	+0.0 +0.4 +0.0 +0.0 +0.0	-34.6 +0.0 +0.0 +0.0	+37.0 +0.0 +0.0	+0.0	36.6	54.0	-17.4	Vert 163
^	7374.255M	37.0	+1.4 +5.4 +0.0 +0.0 +0.0	+0.0 +0.4 +0.0 +0.0 +0.0	-34.6 +0.0 +0.0 +0.0	+37.0 +0.0 +0.0	+0.0	46.6	54.0	-7.4	Vert 180
31	14745.215 M	41.2	+1.6 +8.3 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 -14.5 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	36.6	54.0	-17.4	Vert 121
32	7300.490M Ave	27.2	+1.2 +5.4 +0.0 +0.0 +0.0	+0.0 +0.5 +0.0 +0.0 +0.0	-34.6 +0.0 +0.0 +0.0	+36.8 +0.0 +0.0	+0.0 195	36.5	54.0	-17.5	Vert 148
^	7300.490M	37.9	+1.2 +5.4 +0.0 +0.0 +0.0	+0.0 +0.5 +0.0 +0.0 +0.0	-34.6 +0.0 +0.0 +0.0	+36.8 +0.0 +0.0	+0.0	47.2	54.0	-6.8	Vert 151
34	14597.080 M	41.2	+1.4 +8.2 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 -14.7 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	36.1	54.0	-17.9	Vert 121

35	12288.250 M	39.7	+1.4 +6.9 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 -12.9 +0.0 +0.0	+0.0 +0.0	+0.0	35.1	54.0	-18.9	Vert
									Mid		121
36	9926.986M Ave	23.0	+1.3 +6.3 +0.0 +0.0 +0.0	+0.0 +0.5 +0.0 +0.0 +0.0	-33.9 +0.0 +0.0 +0.0	+37.5 +0.0 +0.0 +0.0	+0.0	34.7	54.0	-19.3	Vert
									High		167
^	9926.986M	38.0	+1.3 +6.3 +0.0 +0.0 +0.0	+0.0 +0.5 +0.0 +0.0 +0.0	-33.9 +0.0 +0.0 +0.0	+37.5 +0.0 +0.0 +0.0	+0.0	49.7	54.0	-4.3	Vert
									High		167
38	12408.800 M	39.2	+1.5 +7.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 -13.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	34.7	54.0	-19.3	Vert
									High		99
39	9828.095M Ave	23.1	+1.3 +6.3 +0.0 +0.0 +0.0	+0.0 +0.4 +0.0 +0.0 +0.0	-33.9 +0.0 +0.0 +0.0	+37.5 +0.0 +0.0 +0.0	+0.0	34.7	54.0	-19.3	Vert
									Mid		163
^	9828.095M	38.5	+1.3 +6.3 +0.0 +0.0 +0.0	+0.0 +0.4 +0.0 +0.0 +0.0	-33.9 +0.0 +0.0 +0.0	+37.5 +0.0 +0.0 +0.0	+0.0	50.1	54.0	-3.9	Vert
									Mid		180
41	9733.010M Ave	22.9	+1.3 +6.2 +0.0 +0.0 +0.0	+0.0 +0.4 +0.0 +0.0 +0.0	-33.9 +0.0 +0.0 +0.0	+37.6 +0.0 +0.0 +0.0	+0.0 106	34.5	54.0	-19.5	Vert
									Low		148
^	9733.010M	38.2	+1.3 +6.2 +0.0 +0.0 +0.0	+0.0 +0.4 +0.0 +0.0 +0.0	-33.9 +0.0 +0.0 +0.0	+37.6 +0.0 +0.0 +0.0	+0.0	49.8	54.0	-4.2	Vert
									Low		151
43	23565.000 M Ave	20.7	+0.0 +0.0 +1.0 +0.0 +0.0	+0.0 +0.0 +1.2 +0.0 +0.0	+0.0 +0.0 +1.9 +0.0	+0.0 +9.7 +0.0 +0.0	+0.0 360	34.5	54.0	-19.5	Vert
											115
^	23565.000 M	35.4	+0.0 +0.0 +1.0 +0.0 +0.0	+0.0 +0.0 +1.2 +0.0 +0.0	+0.0 +0.0 +1.9 +0.0	+0.0 +9.7 +0.0 +0.0	+0.0 360	49.2	54.0	-4.8	Vert
											115

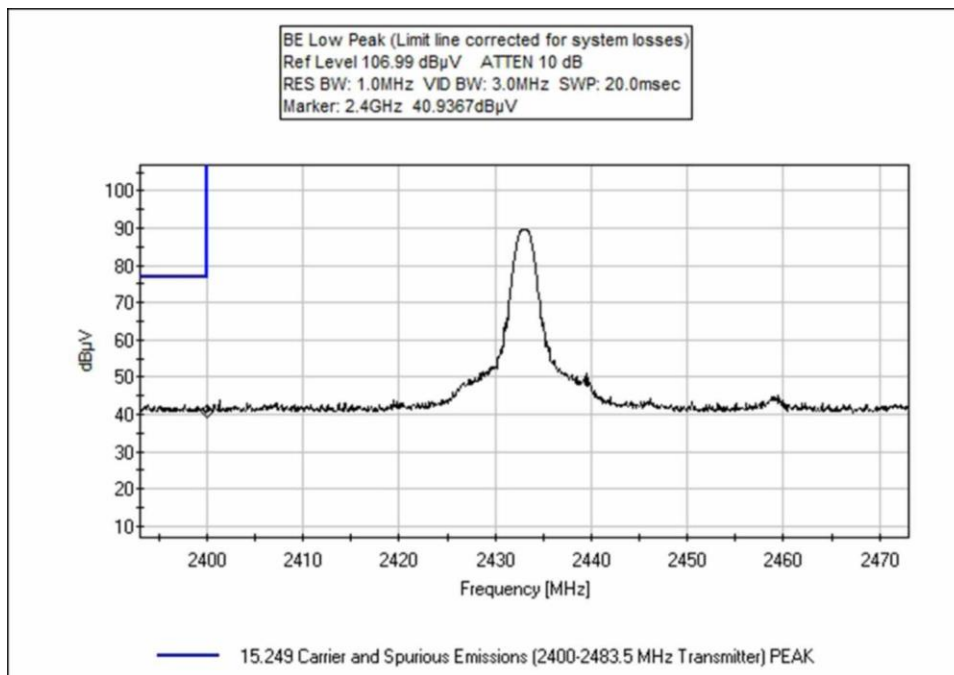
45	12163.175 M	37.9	+1.4 +6.9 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 -12.9 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0	33.3	54.0	-20.7	Vert 121
46	18.487M	23.2	+0.1 +0.2 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +7.8	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	-40.0	-8.7	29.5	-38.2	Groun
47	28.695M	25.6	+0.1 +0.3 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +4.8	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	-40.0	-9.2	29.5	-38.7	Groun
48	12.065M	20.3	+0.0 +0.2 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +9.2	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	-40.0	-10.3	29.5	-39.8	Para
49	24.345M	20.7	+0.1 +0.3 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +6.6	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	-40.0	-12.3	29.5	-41.8	Perp
50	13.745M	15.2	+0.0 +0.2 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +9.3	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	-40.0	-15.3	29.5	-44.8	Para

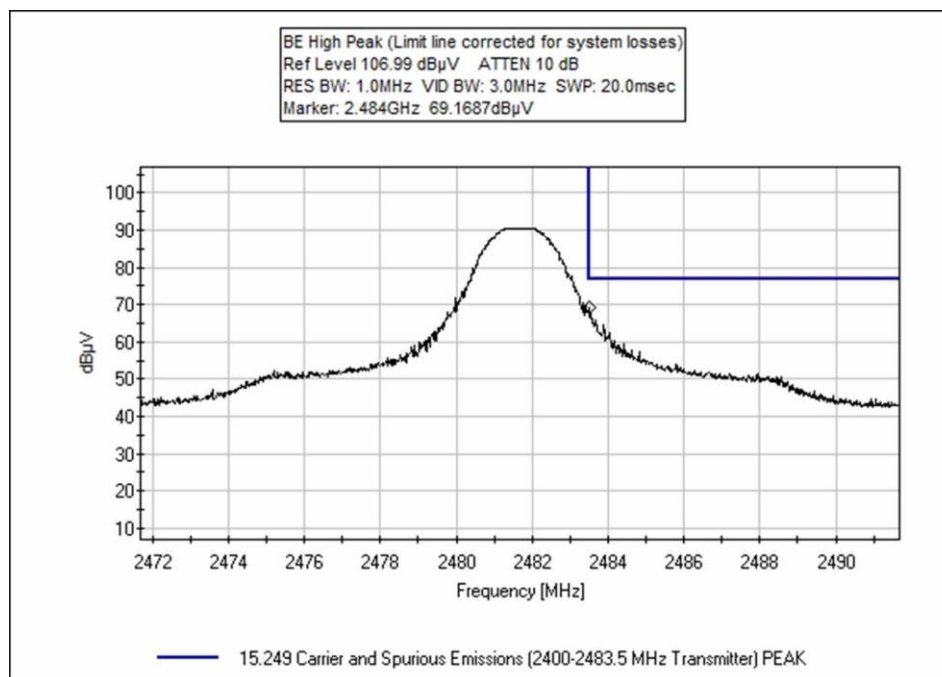
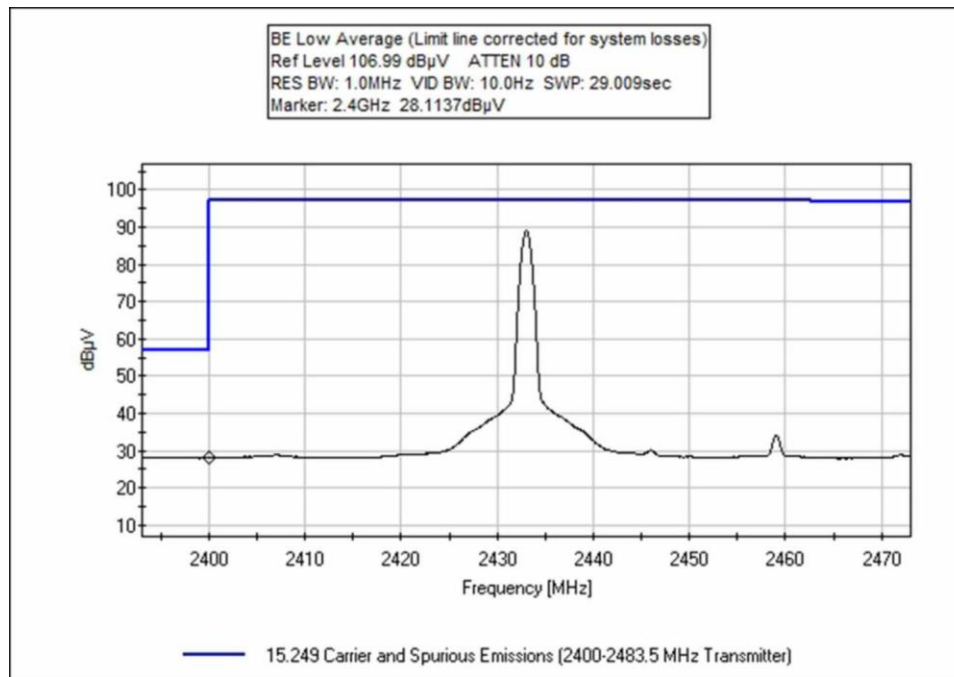
Band Edge

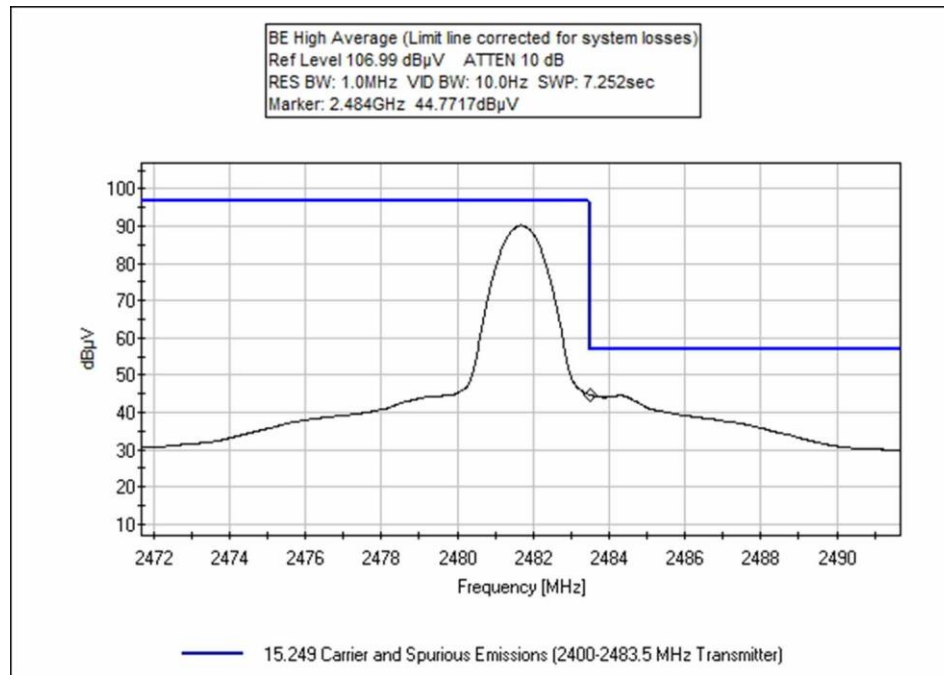
Band Edge Summary

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
2400	GFSK	Integral	25.0	<54	Pass
2483.5	GFSK	Integral	41.8	<54	Pass

Band Edge Plots







Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98201 • 435-402-1717
 Customer: **WiBotic Inc.**
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
 Work Order #: **103494** Date: 5/8/2020
 Test Type: **Maximized Emissions** Time: 10:16:21
 Tested By: Steven Pittsford Sequence#: 33
 Software: EMITest 5.03.12

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23°C Pressure: 102.3kPa Humidity: 33% Frequency tested: 2.433, & 2.4817GHz Firmware power setting: Max Power Duty Cycle: 100% Test Method: ANSI C63.10 (2013) Test Mode: Continuously transmitting all 0 data Test Setup: EUT is located on test bench 1.5m high. EUT is investigated in X, Y & Z axis Vertical and horizontal with worst case reported. EUT is connected to a support laptop outside the test chamber via unshielded CAT 5e. Wireless power is turned off. Temperature (°C): 22-24 Relative Humidity (%): 0-35

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
T2	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T3	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T5	ANP06515	Cable	Heliac	6/29/2018	6/29/2020
T6	ANP07504	Cable	CLU40-KMKM-02.00F	1/17/2019	1/17/2021

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	T5 dB	T6 dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	2483.500M	44.8	+0.6	+0.0	-34.2	+27.6	+0.0	41.8	54.0	-12.2	Vert
	Ave		+2.7	+0.3			342				147
^	2483.500M	69.2	+0.6	+0.0	-34.2	+27.6	+0.0	66.2	54.0	+12.2	Vert
			+2.7	+0.3			342				147
3	2400.000M	28.1	+0.6	+0.0	-34.3	+27.7	+0.0	25.0	54.0	-29.0	Vert
	Ave		+2.6	+0.3			340				151
^	2400.000M	42.4	+0.6	+0.0	-34.3	+27.7	+0.0	39.3	54.0	-14.7	Vert
			+2.6	+0.3			340				151

Test Setup Photo(s)



Below 1GHz



Above 1GHz



X Axis



Y Axis



Z Axis



Below 1GHz with Antenna Port Filled



Below 1GHz with Antenna Port Filled



Above 1GHz with Antenna Port Filled



Above 1GHz with Antenna Port Filled

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98201 • 435-402-1717
 Customer: **WiBotic Inc.**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **103494** Date: 5/8/2020
 Test Type: **Conducted Emissions** Time: 14:07:08
 Tested By: Michael Atkinson Sequence#: 38
 Software: EMITest 5.03.12 115VAC 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

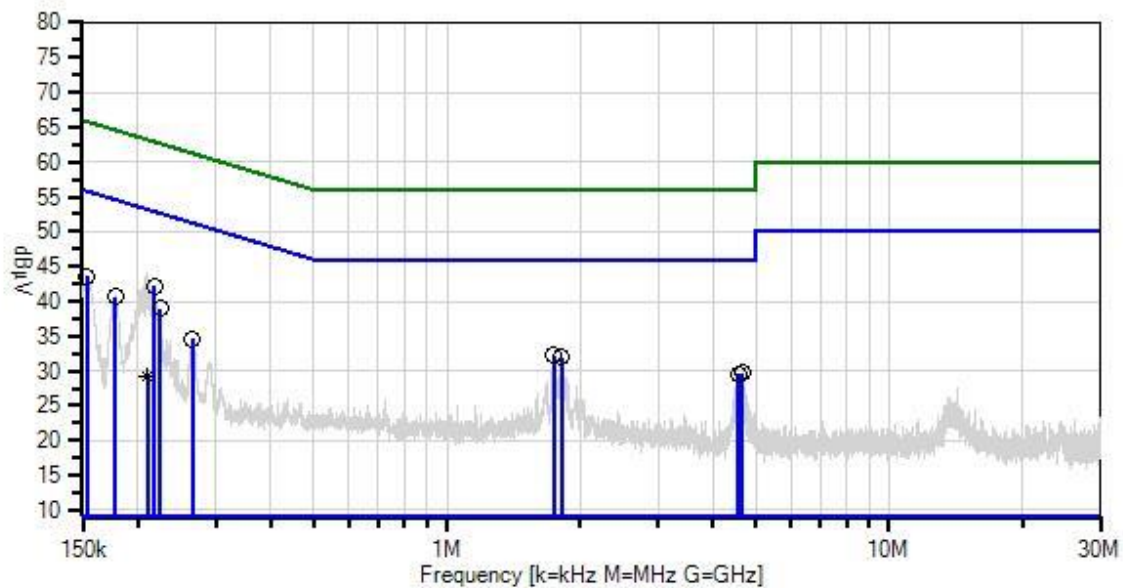
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23°C Pressure: 102.3kPa Humidity: 33% Frequency Range: 0.15-30MHz Firmware power setting: Max Power Duty Cycle: 100% Test Method: ANSI C63.10 (2013) Test Mode: Continuously transmitting Test Setup: EUT is tested in floor standing configuration. EUT is connected to a support laptop outside the test chamber via unshielded CAT 5e. Wireless power is turned off.
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WiBotic Inc. WO#: 103494 Sequence#: 38 Date: 5/8/2020
15.207 AC Mains - Average Test Lead: 115VAC 60Hz Line



— Sweep Data
 × QP Readings
 Software Version: 5.03.12

— Readings
 * Average Readings
 — 1 - 15.207 AC Mains - Average

○ Peak Readings
 ▼ Ambient
 — 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	1/10/2020	1/10/2022
T2	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
T3	ANP06515	Cable	Heliac	6/29/2018	6/29/2020
T4	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
T5	AN01492	50uH LISN-Line (L1)	3816/2NM	10/14/2019	10/14/2021
	AN01492	50uH LISN-Neutral (L2)	3816/2NM	10/14/2019	10/14/2021
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:			Reading listed by margin.					Test Lead: Line			
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V	dB μ V	dB	Ant
1	217.804k	31.6	+0.3 +1.2	+0.0	+0.0	+9.1	+0.0	42.2	52.9	-10.7	Line
2	153.563k	31.7	+0.8 +2.0	+0.0	+0.0	+9.1	+0.0	43.6	55.8	-12.2	Line
3	224.511k	28.3	+0.3 +1.2	+0.0	+0.0	+9.1	+0.0	38.9	52.7	-13.8	Line
4	1.741M	22.3	+0.2 +0.5	+0.0	+0.1	+9.1	+0.0	32.2	46.0	-13.8	Line
5	177.457k	29.7	+0.4 +1.5	+0.0	+0.0	+9.1	+0.0	40.7	54.6	-13.9	Line
6	1.814M	22.2	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	32.0	46.0	-14.0	Line
7	4.661M	19.9	+0.1 +0.5	+0.0	+0.1	+9.1	+0.0	29.7	46.0	-16.3	Line
8	4.570M	19.7	+0.1 +0.5	+0.0	+0.1	+9.1	+0.0	29.5	46.0	-16.5	Line
9	265.121k	24.4	+0.2 +0.9	+0.0	+0.0	+9.1	+0.0	34.6	51.3	-16.7	Line
10	210.573k	18.5	+0.3 +1.3	+0.0	+0.0	+9.1	+0.0	29.2	53.2	-24.0	Line
^	210.573k	33.6	+0.3 +1.3	+0.0	+0.0	+9.1	+0.0	44.3	53.2	-8.9	Line
^	208.896k	33.5	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	44.1	53.2	-9.1	Line
^	207.534k	32.4	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	43.0	53.3	-10.3	Line
^	206.800k	31.8	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	42.4	53.3	-10.9	Line
^	215.393k	31.4	+0.3 +1.2	+0.0	+0.0	+9.1	+0.0	42.0	53.0	-11.0	Line
^	212.774k	31.3	+0.3 +1.2	+0.0	+0.0	+9.1	+0.0	41.9	53.1	-11.2	Line

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE • Bothell, WA 98201 • 435-402-1717
 Customer: **WiBotic Inc.**
 Specification: **15.207 AC Mains - Average**
 Work Order #: **103494** Date: 5/8/2020
 Test Type: **Conducted Emissions** Time: 14:10:22
 Tested By: Michael Atkinson Sequence#: 39
 Software: EMITest 5.03.12 115VAC 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

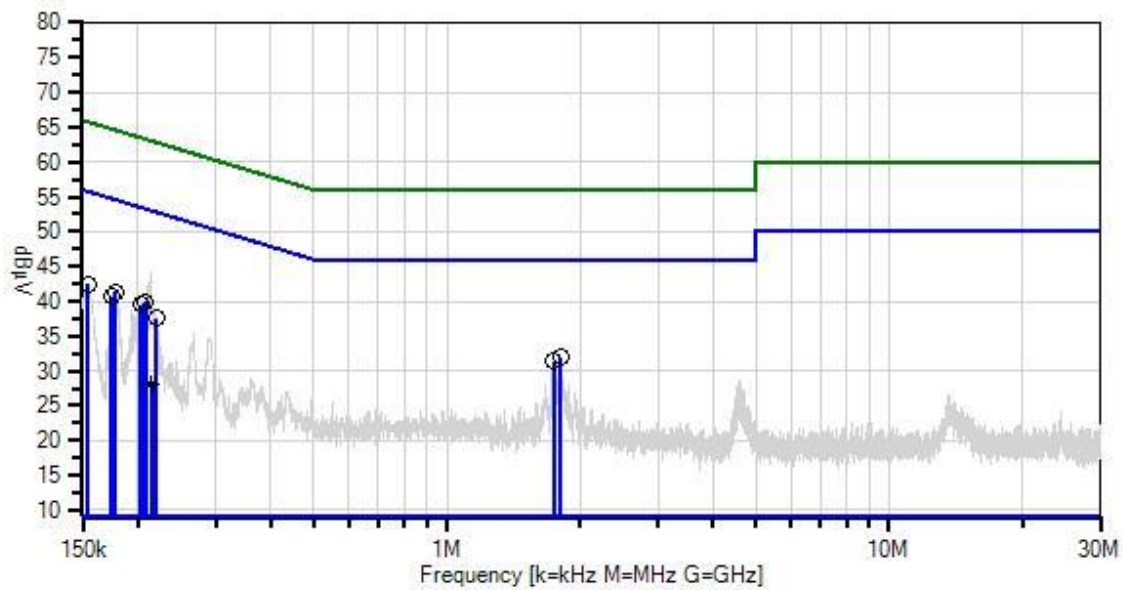
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Temperature: 23°C Pressure: 102.3kPa Humidity: 33% Frequency Range: 0.15-30MHz Firmware power setting: Max Power Duty Cycle: 100% Test Method: ANSI C63.10 (2013) Test Mode: Continuously transmitting Test Setup: EUT is tested in floor standing configuration. EUT is connected to a support laptop outside the test chamber via unshielded CAT 5e. Wireless power is turned off.
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WiBotic Inc. W/O#: 103494 Sequence#: 39 Date: 5/8/2020
15.207 AC Mains - Average Test Lead: 115VAC 60Hz Neutral



— Sweep Data
× QP Readings
Software Version: 5.03.12

— Readings
* Average Readings
— 1 - 15.207 AC Mains - Average

○ Peak Readings
▼ Ambient
— 2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	1/10/2020	1/10/2022
T2	ANP06540	Cable	Heliac	8/23/2019	8/23/2021
T3	ANP06515	Cable	Heliac	6/29/2018	6/29/2020
T4	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
T5	AN01492	50uH LISN-Line (L1)	3816/2NM	10/14/2019	10/14/2021
	AN01492	50uH LISN-Neutral (L2)	3816/2NM	10/14/2019	10/14/2021
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021

Measurement Data:

Reading listed by margin.

Test Lead: Neutral

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V	dB μ V	dB	Ant
1	177.456k	30.3	+0.4 +1.6	+0.0	+0.0	+9.1	+0.0	41.4	54.6	-13.2	Neutr
2	153.876k	30.7	+0.8 +1.8	+0.0	+0.0	+9.1	+0.0	42.4	55.8	-13.4	Neutr
3	208.476k	29.3	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	39.9	53.3	-13.4	Neutr
4	206.799k	29.2	+0.2 +1.3	+0.0	+0.0	+9.1	+0.0	39.8	53.3	-13.5	Neutr
5	203.236k	29.0	+0.2 +1.2	+0.0	+0.0	+9.1	+0.0	39.5	53.5	-14.0	Neutr
6	1.810M	22.1	+0.2 +0.5	+0.0	+0.1	+9.1	+0.0	32.0	46.0	-14.0	Neutr
7	174.521k	29.5	+0.4 +1.6	+0.0	+0.0	+9.1	+0.0	40.6	54.7	-14.1	Neutr
8	1.743M	21.6	+0.2 +0.4	+0.0	+0.1	+9.1	+0.0	31.4	46.0	-14.6	Neutr
9	220.213k	27.0	+0.3 +1.2	+0.0	+0.0	+9.1	+0.0	37.6	52.8	-15.2	Neutr
10	214.240k	17.4	+0.3 +1.3	+0.0	+0.0	+9.1	+0.0	28.1	53.0	-24.9	Neutr
^	214.240k	33.3	+0.3 +1.3	+0.0	+0.0	+9.1	+0.0	44.0	53.0	-9.0	Neutr
^	212.773k	32.2	+0.3 +1.3	+0.0	+0.0	+9.1	+0.0	42.9	53.1	-10.2	Neutr
^	209.838k	31.4	+0.3 +1.3	+0.0	+0.0	+9.1	+0.0	42.1	53.2	-11.1	Neutr
^	212.249k	29.8	+0.3 +1.2	+0.0	+0.0	+9.1	+0.0	40.4	53.1	-12.7	Neutr
^	211.515k	29.3	+0.3 +1.2	+0.0	+0.0	+9.1	+0.0	39.9	53.1	-13.2	Neutr
^	216.755k	27.9	+0.3 +1.2	+0.0	+0.0	+9.1	+0.0	38.5	52.9	-14.4	Neutr

Test Setup Photo(s)



Appendix A: Manufacturer Declaration

The following models have been tested by CKC Laboratories:

TR-301-AC-ST

Since the time of testing, the manufacturer has chosen to use the following model names in its place.
The manufacturer declares that any differences between the names does not affect their EMC characteristics and therefore meets the level of testing equivalent to the tested model name:

TR-301

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	($\text{dB}\mu\text{V}$)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point, the measuring device is set into the linear mode and the scan time is reduced.