Gate Scientific, Inc.

TEST REPORT FOR

Hotplate Stirrer
Model: HPS-01*
(*See Appendix B for Manufacturer Declaration)

Tested o The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.225
(13.110-14.010 MHz)

Report No.: 101223-4

Date of issue: November 1, 2018

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.

Test Certificate # 803.01

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Milpitas, CA 95035

Representative: Morten Jensen

REPORT PREPARED BY:

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

Project Number: 101223

DATE OF EQUIPMENT RECEIPT: September 17, 2018
DATE(S) OF TESTING: September 17-26, 2018 and October 1, 2018

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.
5046 Sierra Pines Drive
Mariposa, CA 95338

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.11

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Mariposa A, CA	US0103	SL2-IN-E-1147R	3082A-2	US1024	A-0136
Mariposa D, CA	US0103	SL2-IN-E-1147R	3082A-1	US1024	A-0136

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.225

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	Mod. #1	Pass
15.225(a)-(c)	Field Strength of Fundamental	Mod. #1	Pass
15.225(e)	Frequency Stability	Mod. #1	Pass
15.225(d)	Field Strength of Spurious Emissions	Mod. #1	Pass
15.207	AC Conducted Emissions	Mod. #1	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
Modification #1 is comprised of the following 7 modifications, as a group and were in place for all tests. 1.) 27mH Common Mode Choke on input Line and Neutral going to the power supply section 2.) 0.1uF Capacitor between Line and Neutral (after choke) 3.a.) 2200pF Capacitor from floating rectified negative to Ground 3.b.) 2200pF Capacitor from floating rectified negative to Ground 3.c.) 2200pF Capacitor from floating rectified positive to Ground 4) Ground connection from low voltage section to case 5) AC Line routed away from under power supply primary
See Appendix A for a photo of the modifications made.

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
WiFi Dongle**	EDIMAX	EW-7611ULB	EW7611ULB82CA02015
Stir Bar	Gate Scientific, Inc.	SB1	NA
Hotplate Stirrer	Gate Scientific, Inc.	HPS-01	002006

**Note: FCC ID: NDD9576111602

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	ASK
Maximum Duty Cycle:	100%
Antenna Type(s) and Gain:	Loop
Antenna Connection Type:	Integral
Nominal Input Voltage:	120VAC
Firmware / Software used for Test:	Instrument software: 20180918

FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

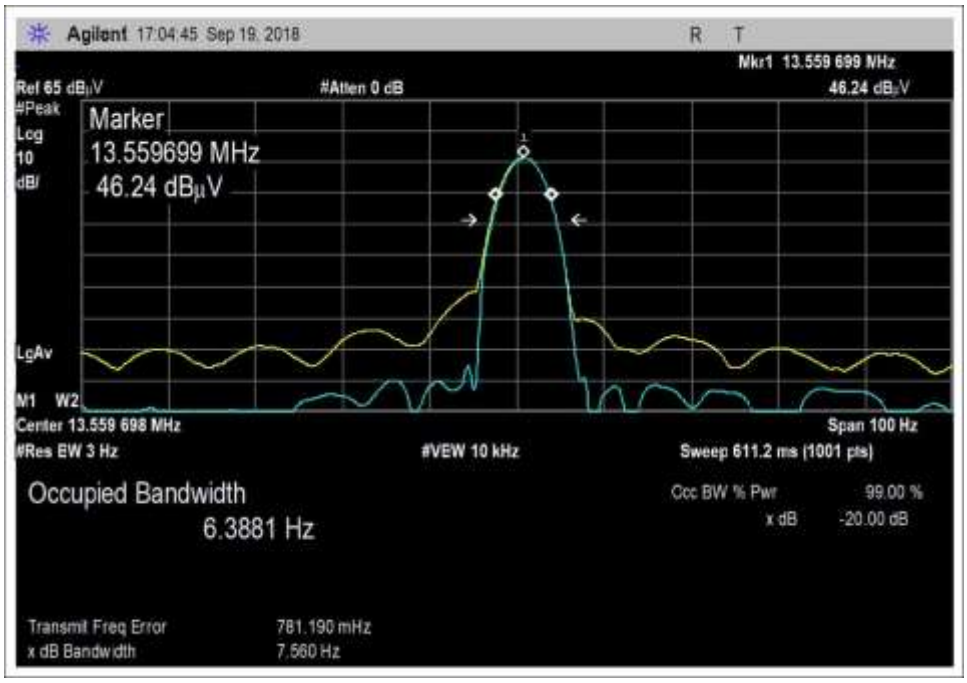
Test Setup/Conditions			
Test Location:	Mariposa Lab D	Test Engineer:	Michael Rauch Jr.
Test Method:	ANSI C63.10 (2013)	Test Date(s):	9/20/2018
Configuration:	1		
Test Setup:	While testing the EUT had its hot plate set to 2% heat, a stir bar was set on top of the hot plate surface. The stir bar was set to stir at 20 RPM. The EUT had all ports populated but the micro USB which is a maintenance port only. The manufacturer declares the maintenance port only accessible to key personnel. The port requires special software to interact with it and is therefore, deemed a maintenance port. The USB port was populated with a WiFi modular adaptor. The EUT was monitoring temperature and had a pH measurement probe in a 3M KCl solution. The EUT's RFID was configured to transmit at 100%. Modification #1 was in place during testing.		

Environmental Conditions			
Temperature (ºC)	23.8	Relative Humidity (%):	35

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
P06229	Cable	Andrew	CXTA04A-50	3/13/2018	3/13/2020
02668	Spectrum Analyzer	Agilent	E4446A	11/15/2017	11/15/2018
MD3M	Cable	NA	NA	3/13/2018	3/13/2020
00226	Loop Antenna	EMCO	6502	6/1/2018	6/1/2020
P06885	Cable	TMS	P06885	9/6/2017	9/6/2019

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
13.562	1	ASK	0.007560	None	NA

Plot



Test Setup Photos

Antenna Setup

15.225(a)-(c) Field Strength of Fundamental

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	$V_{Minimum}$ (dBuV/m@30m)	$V_{Nominal}$ (dBuV/m@30m)	$V_{Maximum}$ (dBuV/m@30m)	Max Deviation from $V_{Nominal}$ (dB)
13.562	ASK/Integral Antenna	20	20.1	20.1	0.1

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

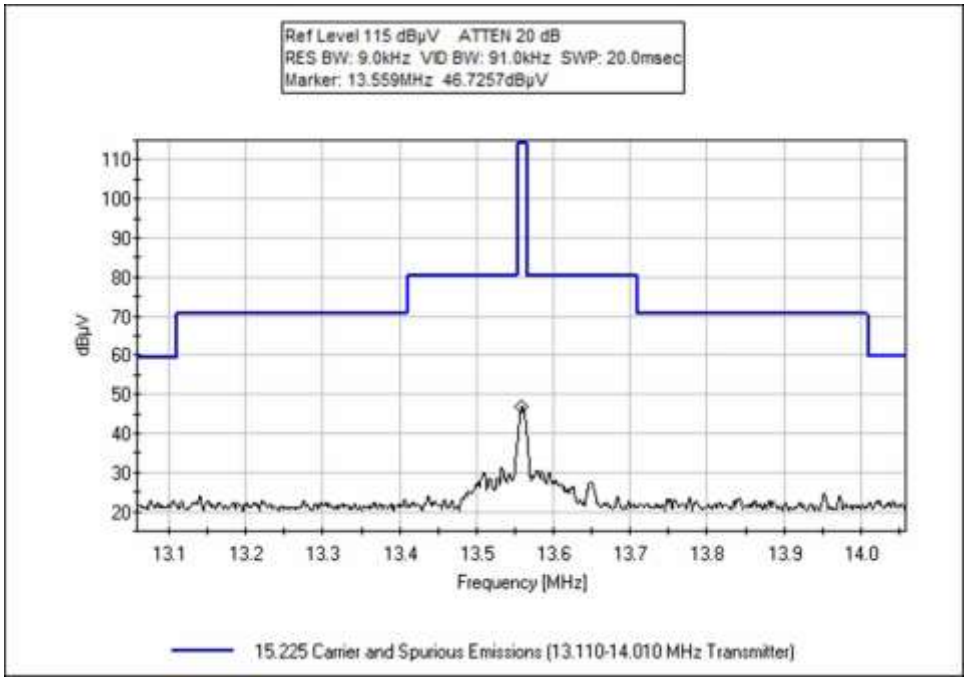
Parameter Definitions:

Measurements performed at input voltage Vnominal ± 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 @ 30m)	Limit (dBuV/m @ 30m)	Results
13.56 (Parallel)	ASK	Integral	20.1	≤84	Pass
13.56 (Perpendicular)	ASK	Integral	12.7	≤84	Pass
13.56 (Ground Parallel)	ASK	Integral	19.8	≤84	Pass

Plot


Ref Level 115 dBµV ATTEN 20 dB
RES BW: 9.0kHz VID BW: 91.0kHz SWP: 20.0msec
Marker: 13.559MHz 46.7257dBµV
110
100
90
80
70
60
50
40
30
20
dBµV
13.1
13.2
13.3
13.4
13.5
13.6
13.7
13.8
13.9
14.0
Frequency [MHz]
15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 5046 Sierra Pines Drive • Mariposa, CA 95338 • (209) 966-5240		
Customer:	**Gate Scientific, Inc.**		
Specification:	**15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**		
Work Order #:	**101223**	Date:	10/1/2018
Test Type:	**Maximized Emissions**	Time:	13:44:37
Tested By:	Michael Rauch Jr.	Sequence#:	1
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Method: ANSI C 63.4 2013
Frequency Range of Interest: 9kHz-30MHz
RBW = 9kHz; VBW > RBW

Environmental Conditions:
Temperature: 27.2°C
Relative Humidity: 25%
Atmospheric Pressure: 102kPa
Test Location: Mariposa Lab D

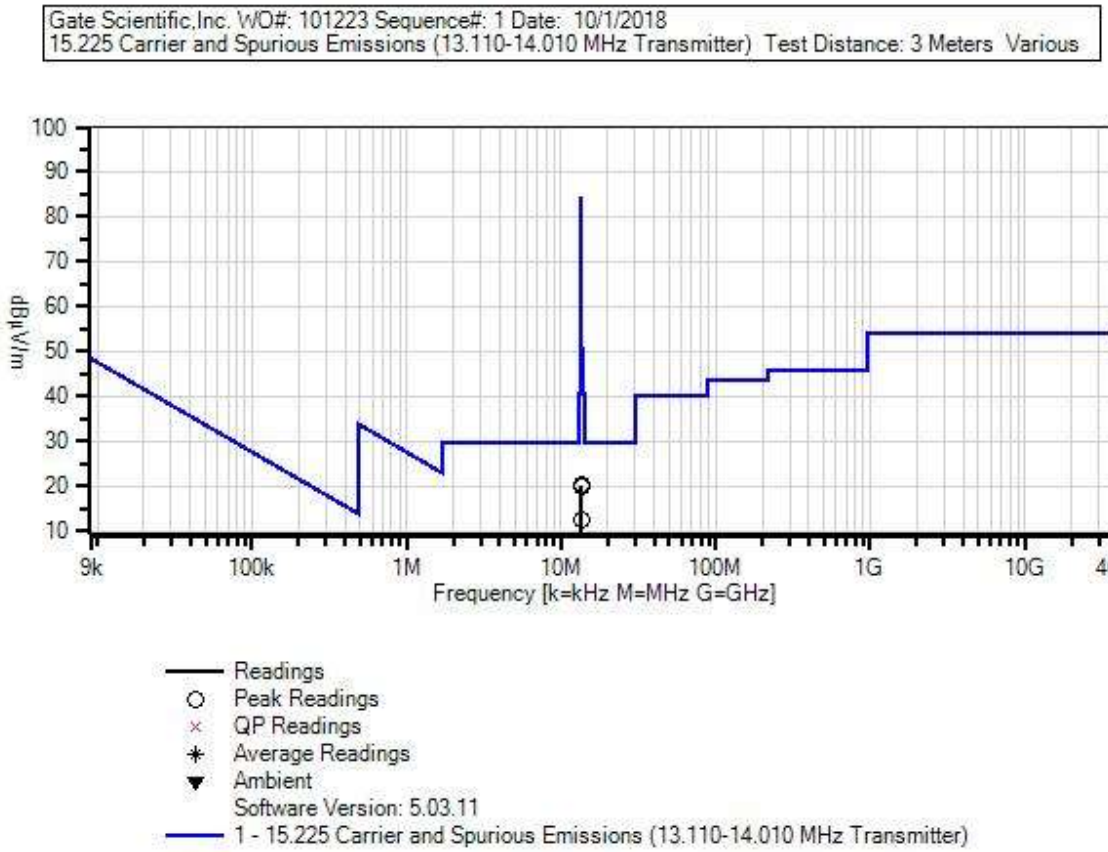
While testing the EUT had its hot plate set to 2% heat, a stir bar was set on top of the hot plate surface. The stir bar was set to stir at 20 RPM.

The EUT had all ports populated but the micro USB which is a maintenance port only.
The manufacturer declares the maintenance port only accessible to key personnel. The port requires special software to interact with it and is therefore, deemed a maintenance port.

The USB port was populated with a WiFi modular adaptor. The EUT was monitoring temperature and had a pH measurement probe in a 3M KCl solution. The EUT's RFID was configured to transmit at 100%.

Protocol / Modulation: ASK
Antenna type: Integral Antenna
Antenna Gain : 0.2 dBi.
Duty Cycle: 100%

Modification #1 was in place during testing.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	11/15/2017	11/15/2018
T1	ANP06885	Cable	P06885	9/6/2017	9/6/2019
T2	AN00226	Loop Antenna	6502	6/1/2018	6/1/2020
T3	ANMD3M	Cable		3/13/2018	3/13/2020
T4	ANP06229	Cable	CXTA04A-50	3/13/2018	3/13/2020

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	13.560M	50.0	+0.1	+9.3	+0.3	+0.4	-40.0	20.1	84.0	-63.9	Paral
2	13.560M	49.7	+0.1	+9.3	+0.3	+0.4	-40.0	19.8	84.0	-64.2	Z-Axi
3	13.560M	42.6	+0.1	+9.3	+0.3	+0.4	-40.0	12.7	84.0	-71.3	Perpe

Test Setup Photos

Antenna Setup

15.225(e) Frequency Stability

Test Setup/Conditions			
Test Location:	Mariposa Lab A	Test Engineer:	Michael Rauch Jr.
Test Method:	ANSI C63.10 (2013)	Test Date(s):	9/21/2018
Configuration:	1		
Test Setup:	While testing the EUT had its hot plate set to 2% heat, The EUT's RFID was configured to transmit at 100%. Operating Voltage: 120VAC Frequency stability measurements made across temperature and voltage variation. The EUT is placed inside the temperature chamber, transmitting at 13.56MHz. The EUT's voltage is regulated at 120VAC. RBW = 200Hz; VBW > RBW Modification #1 was in place during testing.		

Environmental Conditions			
Temperature (ºC)	32.3	Relative Humidity (%):	20

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
1879	Temperature Chamber	Thermotron	S-1.2 Min	11/30/2016	11/30/2018
3197	Multimeter	Extech	102250513	10/12/2016	10/12/2018
2668	Spectrum Analyzer	Agilent	E4446A US44300408	11/15/2017	11/15/2018

Test Data Summary					
Temperature (ºC)	**Voltage**	**Frequency (MHz)**	**Deviation (%)**	**Limit (%)**	**Results**
-20	$V_{Nominal}$	13.55979	0.00054	±0.01	Pass
-10	$V_{Nominal}$	13.55978	0.00046	±0.01	
0	$V_{Nominal}$	13.55973	0.00013	±0.01	
10	$V_{Nominal}$	13.55971	0.00002	±0.01	
20	$V_{Minimum}$	13.55975	0.00021	±0.01	
20	$V_{Nominal}$	13.55972	0.0000	±0.01	
20	$V_{Maximum}$	13.55975	0.00019	±0.01	
30	$V_{Nominal}$	13.55971	0.00001	±0.01	
40	$V_{Nominal}$	13.55971	0.00001	±0.01	
50	$V_{Nominal}$	13.55971	0.00004	±0.01	
Nominal Frequency:		13.55972			

Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	120 VAC
$V_{Minimum}$:	102.00 VAC
$V_{Maximum}$:	138.00 VAC

Test Setup Photos

Temperature Chamber

Temperature Chamber

15.225(d) Radiated Emissions

Test Setup / Conditions/ Data

Test Location:	CKC Laboratories, Inc. • 5046 Sierra Pines Drive • Mariposa, CA 95338 • (209) 966-5240		
Customer:	**Gate Scientific, Inc.**		
Specification:	**15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**		
Work Order #:	**101223**	Date:	9/17/2018
Test Type:	**Maximized Emissions**	Time:	19:29:05
Tested By:	Michael Rauch Jr.	Sequence#:	2
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Method: ANSI C 63.4 2013
Frequency Range of Interest: 9kHz-30MHz
RBW = 9kHz; VBW > RBW

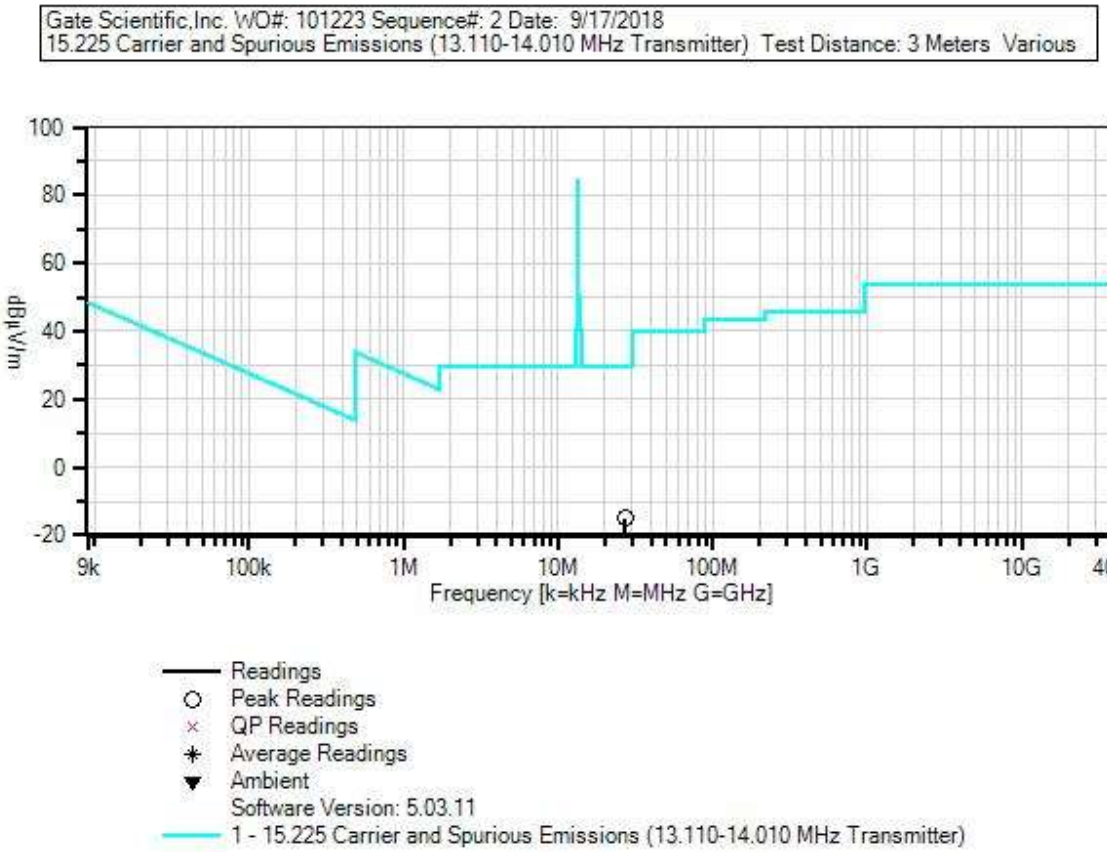
Temperature: 29.1°C
Relative Humidity: 29%
Atmospheric Pressure: 102.1kPa
Test Location: Mariposa Lab D

While testing the EUT had its hot plate set to 2% heat, a stir bar was set on top of the hot plate surface. The stir bar was set to stir at 20 RPM.

The EUT had all ports populated but the micro USB which is a maintenance port only.
The manufacturer declares the maintenance port only accessible to key personnel. The port requires special software to interact with it and is therefore, deemed a maintenance port.
The USB port was populated with a WiFi modular adaptor. The EUT was monitoring temperature and had a pH measurement probe in a 3M KCl solution. The EUT's RFID was configured to transmit at 100%.

Protocol / Modulation: ASK
Antenna type: Integral Antenna
Antenna Gain : 0.2 dBi.
Duty Cycle: 100%

Modification #1 was in place during testing.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	6/1/2018	6/1/2020
T2	ANP06885	Cable	P06885	9/6/2017	9/6/2019
	AN02668	Spectrum Analyzer	E4446A	11/15/2017	11/15/2018
T3	ANP06229	Cable	CXTA04A-50	3/13/2018	3/13/2020
T4	ANMD3M	Cable		3/13/2018	3/13/2020

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	27.120M	18.2	+5.9	+0.1	+0.5	+0.4	-40.0	-14.9	29.5	-44.4	Perpe
2	27.120M	12.1	+5.9	+0.1	+0.5	+0.4	-40.0	-21.0	29.5	-50.5	Parra

Test Location:	CKC Laboratories, Inc. • 5046 Sierra Pines Drive • Mariposa, CA 95338 • (209) 966-5240		
Customer:	**Gate Scientific, Inc.**		
Specification:	**15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**		
Work Order #:	**101223**	Date:	10/3/2018
Test Type:	**Maximized Emissions**	Time:	10:30:56
Tested By:	Michael Rauch Jr.	Sequence#:	1
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Method: ANSI C 63.4 2013
Frequency Range of Interest: 30-1000MHz
RBW = 120kHz; VBW > RBW

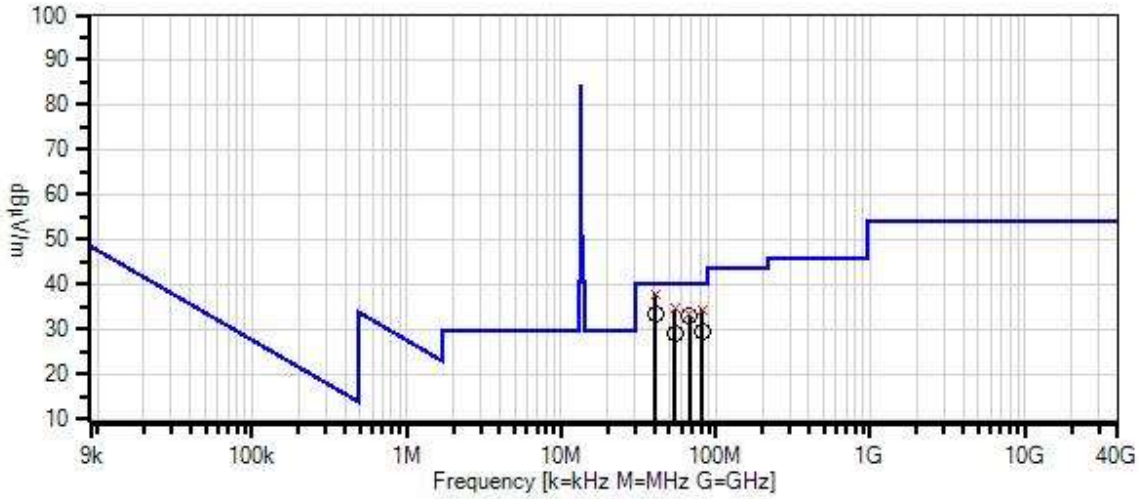
Environmental Conditions:
Temperature: 29.1°C
Relative Humidity: 29%
Atmospheric Pressure: 102.1kPa
Test Location: Mariposa Lab D

While testing the EUT had its hot plate set to 2% heat, a stir bar was set on top of the hot plate surface. The stir bar was set to stir at 20 RPM.
The EUT had all ports populated but the micro USB which is a maintenance port only.
The manufacturer declares the maintenance port only accessible to key personnel. The port requires special software to interact with it and is therefore, deemed a maintenance port.
The USB port was populated with a WiFi modular adaptor. The EUT was monitoring temperature and had a pH measurement probe in a 3M KCl solution. The EUT's RFID was configured to transmit at 100%.

Protocol / Modulation: ASK
Antenna type: Integral Antenna
Antenna Gain : 0.2 dBi.
Duty Cycle: 100%

Modification #1 was in place during testing.

Gate Scientific,Inc. WO#: 101223 Sequence#: 1 Date: 10/3/2018
15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter) Test Distance: 10 Meters Various



Readings
Peak Readings
QP Readings
Average Readings
Ambient
Software Version: 5.03.11
1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN01993	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T2	ANP05656	Attenuator	PE7004-6	1/18/2018	1/18/2020
T3	ANMD10M	Cable		3/13/2018	3/13/2020
T4	ANP06884	Cable	LMR195-FR-4	8/1/2017	8/1/2019
T5	ANP06885	Cable	P06885	9/6/2017	9/6/2019
T6	ANP06229	Cable	CXTA04A-50	3/13/2018	3/13/2020
T7	AN02668	Spectrum Analyzer	E4446A	11/15/2017	11/15/2018
T8	AN00282	Preamp	8447D	1/9/2018	1/9/2020

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	40.678M	34.3	+12.9	+6.0	+0.7	+0.2	+10.5	37.8	40.0	-2.2	Vert
	QP		+0.2	+0.7	+0.0	-27.7					
^	40.658M	39.6	+12.9	+6.0	+0.7	+0.2	+10.5	43.1	40.0	+3.1	Vert
			+0.2	+0.7	+0.0	-27.7					
3	54.239M	36.6	+7.2	+6.0	+0.8	+0.2	+10.5	34.6	40.0	-5.4	Vert
	QP		+0.2	+0.8	+0.0	-27.7					
^	54.248M	41.0	+7.2	+6.0	+0.8	+0.2	+10.5	39.0	40.0	-1.0	Vert
			+0.2	+0.8	+0.0	-27.7					
5	81.372M	35.7	+7.4	+6.0	+1.0	+0.3	+10.5	34.4	40.0	-5.6	Vert
	QP		+0.2	+0.9	+0.0	-27.6					
^	81.372M	38.8	+7.4	+6.0	+1.0	+0.3	+10.5	37.5	40.0	-2.5	Vert
			+0.2	+0.9	+0.0	-27.6					
7	40.678M	29.9	+12.9	+6.0	+0.7	+0.2	+10.5	33.4	40.0	-6.6	Horiz
			+0.2	+0.7	+0.0	-27.7					
8	67.810M	36.2	+6.0	+6.0	+0.9	+0.2	+10.5	33.2	40.0	-6.8	Vert
	QP		+0.2	+0.9	+0.0	-27.7					
^	67.810M	43.1	+6.0	+6.0	+0.9	+0.2	+10.5	40.1	40.0	+0.1	Vert
			+0.2	+0.9	+0.0	-27.7					
10	67.808M	35.9	+6.0	+6.0	+0.9	+0.2	+10.5	32.9	40.0	-7.1	Horiz
			+0.2	+0.9	+0.0	-27.7					
11	81.368M	30.7	+7.4	+6.0	+1.0	+0.3	+10.5	29.4	40.0	-10.6	Horiz
			+0.2	+0.9	+0.0	-27.6					
12	54.238M	31.0	+7.2	+6.0	+0.8	+0.2	+10.5	29.0	40.0	-11.0	Horiz
			+0.2	+0.8	+0.0	-27.7					

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 5046 Sierra Pines Drive • Mariposa, CA 95338 • (209) 966-5240		
Customer:	**Gate Scientific, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**101223**	Date:	9/26/2018
Test Type:	**Conducted Emissions**	Time:	11:20:41
Tested By:	Michael Rauch Jr.	Sequence#:	5
Software:	EMITest 5.03.11		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Method: ANSI C 63.4 2013
Frequency Range of Interest: 150kHz-30MHz
RBW = 9kHz; VBW > RBW

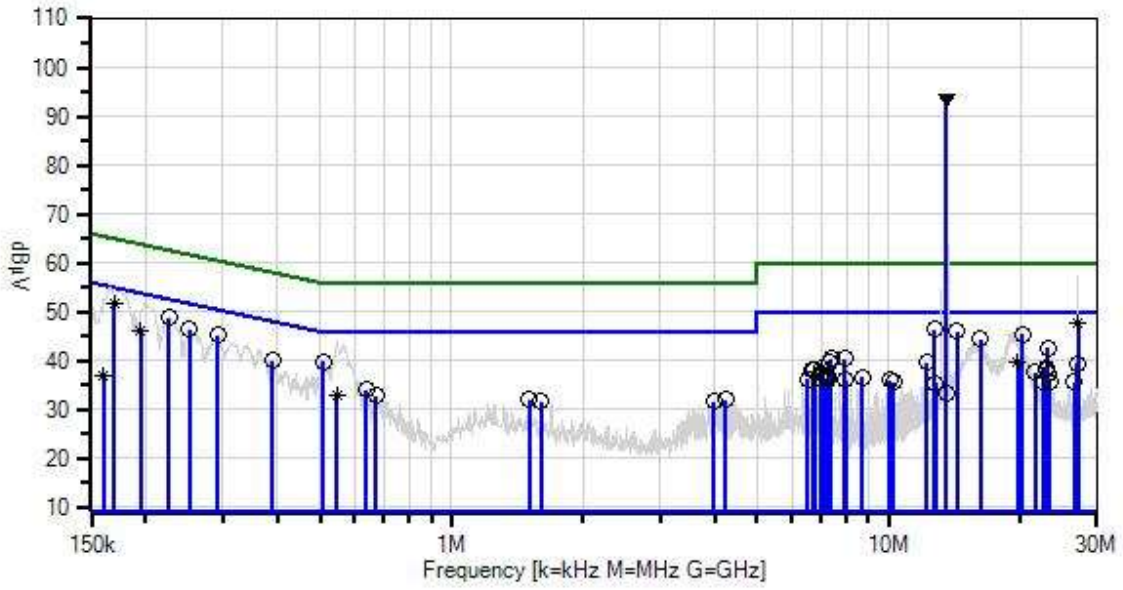
Environmental Conditions:
Temperature: 23.8°C
Relative Humidity: 35%
Atmospheric Pressure: 102.2kPa

While testing the EUT had its hot plate set to 2% heat, a stir bar was set on top of the hot plate surface. The stir bar was set to stir at 20 RPM.
The EUT had all ports populated but the micro USB which is a maintenance port only.
The manufacturer declares the maintenance port only accessible to key personnel. The port requires special software to interact with it and is therefore, deemed a maintenance port.
The USB port was populated with a WiFi modular adaptor. The EUT was monitoring temperature and had a pH measurement probe in a 3M KCl solution. The EUT's RFID was configured to transmit at 100%.

Protocol / Modulation: ASK
Antenna type: Integral Antenna
Antenna Gain : 0.2 dBi.
Duty Cycle: 100%

Modification #1 was in place during testing.

Gate Scientific,Inc. WO#: 101223 Sequence#: 5 Date: 9/26/2018
15.207 AC Mains - Average Test Lead: 120V 60Hz Line



Sweep Data
× QP Readings
Software Version: 5.03.11
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	AN01248	50uH LISN-Line (L1) (dB)	8028-50-TS-24-BNC	1/11/2018	1/11/2019
	AN01248	50uH LISN-Return (L2) (dB)	8028-50-TS-24-BNC	1/11/2018	1/11/2019
T2	ANP05624	Attenuator	PE7010-10	1/15/2017	1/15/2019
T3	ANP06232	Cable	CXTA04A-35	3/12/2018	3/12/2020
T4	AN02668	Spectrum Analyzer	E4446A	11/15/2017	11/15/2018
T5	AN02609	High Pass Filter	HE9615-150K-50-720B	1/12/2018	1/12/2020
T6	ANMD INT	Cable	Under ground cables only	3/13/2018	3/13/2020
T7	ANP06885	Cable	P06885	9/6/2017	9/6/2019

Measurement Data: Reading listed by margin. Test Lead: Line

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	13.562M	82.9	+0.1	+10.0	+0.3	+0.0	+0.0	93.7	50.0	+43.7	Line
	Ambient		+0.1	+0.2	+0.1				Fundamental		
2	27.119M	36.7	+0.1	+10.0	+0.4	+0.0	+0.0	47.7	50.0	-2.3	Line
	Ave		+0.2	+0.2	+0.1				2nd Harmonic of Fundamental		
^	27.119M	46.3	+0.1	+10.0	+0.4	+0.0	+0.0	57.3	50.0	+7.3	Line
			+0.2	+0.2	+0.1				2nd Harmonic of Fundamental		
4	169.289k	41.0	+0.2	+10.0	+0.0	+0.0	+0.0	51.6	55.0	-3.4	Line
	Ave		+0.4	+0.0	+0.0						
^	165.270k	44.5	+0.2	+10.0	+0.0	+0.0	+0.0	55.2	55.2	+0.0	Line
			+0.5	+0.0	+0.0						
6	12.743M	35.6	+0.1	+10.0	+0.3	+0.0	+0.0	46.4	50.0	-3.6	Line
			+0.1	+0.2	+0.1						
7	226.355k	38.5	+0.2	+10.0	+0.0	+0.0	+0.0	48.9	52.6	-3.7	Line
			+0.2	+0.0	+0.0						
8	14.346M	35.2	+0.1	+10.0	+0.3	+0.0	+0.0	46.0	50.0	-4.0	Line
			+0.1	+0.2	+0.1						
9	20.256M	34.5	+0.1	+10.0	+0.3	+0.0	+0.0	45.4	50.0	-4.6	Line
			+0.2	+0.2	+0.1						
10	251.080k	36.1	+0.2	+10.0	+0.0	+0.0	+0.0	46.5	51.7	-5.2	Line
			+0.2	+0.0	+0.0						
11	292.531k	34.9	+0.2	+10.0	+0.0	+0.0	+0.0	45.2	50.5	-5.3	Line
			+0.1	+0.0	+0.0						
12	16.247M	33.5	+0.1	+10.0	+0.3	+0.0	+0.0	44.4	50.0	-5.6	Line
			+0.2	+0.2	+0.1						
13	509.965k	29.4	+0.2	+10.0	+0.0	+0.0	+0.0	39.8	46.0	-6.2	Line
			+0.2	+0.0	+0.0						

14	23.130M	31.7	+0.1 +0.2	+10.0 +0.2	+0.4 +0.1	+0.0	+0.0	42.7	50.0	-7.3	Line
15	194.617k Ave	35.8	+0.2 +0.2	+10.0 +0.0	+0.0 +0.0	+0.0	+0.0	46.2	53.8	-7.6	Line
^	197.994k	41.2	+0.2 +0.2	+10.0 +0.0	+0.0 +0.0	+0.0	+0.0	51.6	53.7	-2.1	Line
17	389.976k	29.7	+0.2 +0.1	+10.0 +0.0	+0.0 +0.0	+0.0	+0.0	40.0	48.1	-8.1	Line
18	7.923M	29.9	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	40.5	50.0	-9.5	Line
19	7.373M	29.9	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	40.5	50.0	-9.5	Line
20	7.310M	29.3	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	39.9	50.0	-10.1	Line
21	19.707M Ave	29.0	+0.1 +0.2	+10.0 +0.2	+0.3 +0.1	+0.0	+0.0	39.9	50.0	-10.1	Line
^	19.706M	36.1	+0.1 +0.2	+10.0 +0.2	+0.3 +0.1	+0.0	+0.0	47.0	50.0	-3.0	Line
23	12.238M	28.8	+0.1 +0.1	+10.0 +0.2	+0.3 +0.1	+0.0	+0.0	39.6	50.0	-10.4	Line
24	27.006M	28.5	+0.1 +0.2	+10.0 +0.2	+0.4 +0.1	+0.0	+0.0	39.5	50.0	-10.5	Line
25	7.067M	28.0	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	38.6	50.0	-11.4	Line
26	22.878M	27.4	+0.1 +0.2	+10.0 +0.2	+0.4 +0.1	+0.0	+0.0	38.4	50.0	-11.6	Line
27	23.067M	27.2	+0.1 +0.2	+10.0 +0.2	+0.4 +0.1	+0.0	+0.0	38.2	50.0	-11.8	Line
28	6.761M	27.5	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	38.1	50.0	-11.9	Line
29	637.227k	23.7	+0.2 +0.2	+10.0 +0.0	+0.0 +0.0	+0.0	+0.0	34.1	46.0	-11.9	Line
30	6.707M	27.4	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	38.0	50.0	-12.0	Line
31	21.661M	26.7	+0.1 +0.2	+10.0 +0.2	+0.3 +0.1	+0.0	+0.0	37.6	50.0	-12.4	Line
32	7.040M	26.9	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	37.5	50.0	-12.5	Line
33	23.189M	26.2	+0.1 +0.2	+10.0 +0.2	+0.4 +0.1	+0.0	+0.0	37.2	50.0	-12.8	Line
34	7.256M	26.3	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	36.9	50.0	-13.1	Line
35	547.782k Ave	22.4	+0.2 +0.2	+10.0 +0.0	+0.0 +0.0	+0.0	+0.0	32.8	46.0	-13.2	Line
^	547.780k	33.8	+0.2 +0.2	+10.0 +0.0	+0.0 +0.0	+0.0	+0.0	44.2	46.0	-1.8	Line
37	670.678k	22.4	+0.2 +0.2	+10.0 +0.0	+0.0 +0.0	+0.0	+0.0	32.8	46.0	-13.2	Line
38	8.716M	26.0	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	36.6	50.0	-13.4	Line
39	6.977M	25.9	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	36.5	50.0	-13.5	Line

40	7.157M	25.9	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	36.5	50.0	-13.5	Line
41	7.283M	25.7	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	36.3	50.0	-13.7	Line
42	6.517M	25.7	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	36.3	50.0	-13.7	Line
43	1.507M	21.5	+0.2 +0.2	+10.0 +0.1	+0.1 +0.0	+0.0	+0.0	32.1	46.0	-13.9	Line
44	4.228M	21.6	+0.1 +0.1	+10.0 +0.1	+0.1 +0.1	+0.0	+0.0	32.1	46.0	-13.9	Line
45	10.058M	25.5	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	36.1	50.0	-13.9	Line
46	7.986M	25.5	+0.1 +0.1	+10.0 +0.1	+0.2 +0.1	+0.0	+0.0	36.1	50.0	-13.9	Line
47	1.600M	21.2	+0.2 +0.1	+10.0 +0.1	+0.1 +0.0	+0.0	+0.0	31.7	46.0	-14.3	Line
48	23.367M	24.7	+0.1 +0.2	+10.0 +0.2	+0.4 +0.1	+0.0	+0.0	35.7	50.0	-14.3	Line
49	3.986M	21.2	+0.1 +0.1	+10.0 +0.1	+0.1 +0.1	+0.0	+0.0	31.7	46.0	-14.3	Line
50	10.247M	24.9	+0.1 +0.1	+10.0 +0.2	+0.2 +0.1	+0.0	+0.0	35.6	50.0	-14.4	Line
51	26.608M	24.6	+0.1 +0.2	+10.0 +0.2	+0.4 +0.1	+0.0	+0.0	35.6	50.0	-14.4	Line
52	22.580M	24.6	+0.1 +0.2	+10.0 +0.2	+0.4 +0.1	+0.0	+0.0	35.6	50.0	-14.4	Line
53	12.806M	24.7	+0.1 +0.1	+10.0 +0.2	+0.3 +0.1	+0.0	+0.0	35.5	50.0	-14.5	Line
54	13.562M	22.4	+0.1 +0.1	+10.0 +0.2	+0.3 +0.1	+0.0	+0.0	33.2	50.0 Fundamental w/ Load attached	-16.8	Line
55	160.078k Ave	25.8	+0.2 +0.9	+10.0 +0.0	+0.0 +0.0	+0.0	+0.0	36.9	55.5	-18.6	Line

Test Location:	CKC Laboratories, Inc. • 5046 Sierra Pines Drive • Mariposa, CA 95338 • (209) 966-5240		
Customer:	**Gate Scientific, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**101223**	Date:	9/26/2018
Test Type:	**Conducted Emissions**	Time:	11:17:53
Tested By:	Michael Rauch Jr.	Sequence#:	4
Software:	EMITest 5.03.11		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Method: ANSI C 63.4 2013
Frequency Range of Interest: 150kHz-30MHz
RBW = 9kHz; VBW > RBW

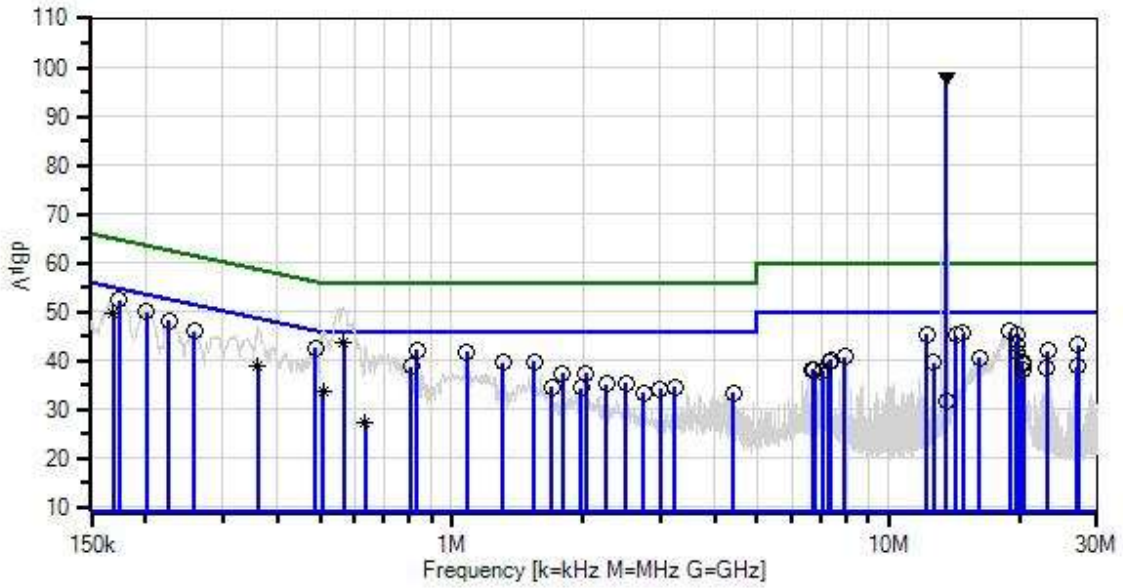
Environmental Conditions:
Temperature: 23.8°C
Relative Humidity: 35%
Atmospheric Pressure: 102.2kPa

While testing the EUT had its hot plate set to 2% heat, a stir bar was set on top of the hot plate surface. The stir bar was set to stir at 20 RPM.
The EUT had all ports populated but the micro USB which is a maintenance port only.
The manufacturer declares the maintenance port only accessible to key personnel. The port requires special software to interact with it and is therefore, deemed a maintenance port.
The USB port was populated with a WiFi modular adaptor. The EUT was monitoring temperature and had a pH measurement probe in a 3M KCl solution. The EUT's RFID was configured to transmit at 100%.

Protocol / Modulation: ASK
Antenna type: Integral Antenna
Antenna Gain : 0.2 dBi.
Duty Cycle: 100%

Modification #1 was in place during testing.

Gate Scientific,Inc. WO#: 101223 Sequence#: 4 Date: 9/26/2018
15.207 AC Mains - Average Test Lead: 120V 60Hz Return



Sweep Data
× QP Readings
Software Version: 5.03.11
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	ANP05624	Attenuator	PE7010-10	1/15/2017	1/15/2019
T2	ANP06232	Cable	CXTA04A-35	3/12/2018	3/12/2020
T3	ANP06885	Cable	P06885	9/6/2017	9/6/2019
	AN01248	50uH LISN-Line (L1) (dB)	8028-50-TS-24-BNC	1/11/2018	1/11/2019
T4	AN01248	50uH LISN-Return (L2) (dB)	8028-50-TS-24-BNC	1/11/2018	1/11/2019
T5	AN02668	Spectrum Analyzer	E4446A	11/15/2017	11/15/2018
T6	AN02609	High Pass Filter	HE9615-150K-50-720B	1/12/2018	1/12/2020
T7	ANMD INT	Cable	Under ground cables only	3/13/2018	3/13/2020

Measurement Data: Reading listed by margin. Test Lead: Return

#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	13.562M	87.1	+10.0	+0.3	+0.1	+0.1	+0.0	97.9	50.0	+47.9	Retur
	Ambient		+0.0	+0.1	+0.2				Fundamental		
2	566.002k	33.3	+10.0	+0.0	+0.0	+0.2	+0.0	43.7	46.0	-2.3	Retur
	Ave		+0.0	+0.2	+0.0						
^	565.960k	40.7	+10.0	+0.0	+0.0	+0.2	+0.0	51.1	46.0	+5.1	Retur
			+0.0	+0.2	+0.0						
4	173.997k	41.9	+10.0	+0.0	+0.0	+0.2	+0.0	52.5	54.8	-2.3	Retur
			+0.0	+0.4	+0.0						
5	200.904k	39.7	+10.0	+0.0	+0.0	+0.2	+0.0	50.1	53.6	-3.5	Retur
			+0.0	+0.2	+0.0						
6	488.877k	32.2	+10.0	+0.0	+0.0	+0.2	+0.0	42.6	46.2	-3.6	Retur
			+0.0	+0.2	+0.0						
7	835.755k	31.8	+10.0	+0.1	+0.0	+0.1	+0.0	42.2	46.0	-3.8	Retur
			+0.0	+0.2	+0.0						
8	18.914M	35.2	+10.0	+0.3	+0.1	+0.1	+0.0	46.1	50.0	-3.9	Retur
			+0.0	+0.2	+0.2						
9	1.086M	31.4	+10.0	+0.1	+0.0	+0.1	+0.0	41.8	46.0	-4.2	Retur
			+0.0	+0.2	+0.0						
10	226.356k	37.9	+10.0	+0.0	+0.0	+0.2	+0.0	48.3	52.6	-4.3	Retur
			+0.0	+0.2	+0.0						
11	14.779M	34.8	+10.0	+0.3	+0.1	+0.1	+0.0	45.7	50.0	-4.3	Retur
			+0.0	+0.2	+0.2						
12	19.706M	34.5	+10.0	+0.3	+0.1	+0.1	+0.0	45.4	50.0	-4.6	Retur
			+0.0	+0.2	+0.2						
13	12.220M	34.6	+10.0	+0.3	+0.1	+0.1	+0.0	45.4	50.0	-4.6	Retur
			+0.0	+0.1	+0.2						
14	14.283M	34.5	+10.0	+0.3	+0.1	+0.1	+0.0	45.3	50.0	-4.7	Retur
			+0.0	+0.1	+0.2						
15	258.353k	35.7	+10.0	+0.0	+0.0	+0.2	+0.0	46.1	51.5	-5.4	Retur
			+0.0	+0.2	+0.0						
16	168.524k	39.0	+10.0	+0.0	+0.0	+0.2	+0.0	49.6	55.0	-5.4	Retur
	Ave		+0.0	+0.4	+0.0						

17	1.549M	29.4	+10.0 +0.0	+0.1 +0.2	+0.0 +0.1	+0.1	+0.0	39.9	46.0	-6.1	Retur
18	1.311M	29.2	+10.0 +0.0	+0.1 +0.2	+0.0 +0.1	+0.1	+0.0	39.7	46.0	-6.3	Retur
19	19.580M	32.4	+10.0 +0.0	+0.3 +0.2	+0.1 +0.2	+0.1	+0.0	43.3	50.0	-6.7	Retur
20	27.120M	32.3	+10.0 +0.0	+0.4 +0.2	+0.1 +0.2	+0.1	+0.0	43.3	50.0 2nd Harmonic of Fundamental	-6.7	Retur
21	808.848k	28.4	+10.0 +0.0	+0.1 +0.2	+0.0 +0.0	+0.1	+0.0	38.8	46.0	-7.2	Retur
22	23.130M	31.1	+10.0 +0.0	+0.4 +0.2	+0.1 +0.2	+0.1	+0.0	42.1	50.0	-7.9	Retur
23	19.770M	30.7	+10.0 +0.0	+0.3 +0.2	+0.1 +0.2	+0.1	+0.0	41.6	50.0	-8.4	Retur
24	2.034M	27.1	+10.0 +0.0	+0.1 +0.1	+0.0 +0.1	+0.1	+0.0	37.5	46.0	-8.5	Retur
25	1.792M	27.1	+10.0 +0.0	+0.1 +0.1	+0.0 +0.1	+0.1	+0.0	37.5	46.0	-8.5	Retur
26	7.923M	30.3	+10.0 +0.0	+0.2 +0.1	+0.1 +0.1	+0.1	+0.0	40.9	50.0	-9.1	Retur
27	16.166M	29.8	+10.0 +0.0	+0.3 +0.2	+0.1 +0.2	+0.1	+0.0	40.7	50.0	-9.3	Retur
28	7.373M	29.7	+10.0 +0.0	+0.2 +0.1	+0.1 +0.1	+0.1	+0.0	40.3	50.0	-9.7	Retur
29 Ave	360.113k	28.5	+10.0 +0.0	+0.0 +0.1	+0.0 +0.0	+0.2	+0.0	38.8	48.7	-9.9	Retur
^	360.162k	36.9	+10.0 +0.0	+0.0 +0.1	+0.0 +0.0	+0.2	+0.0	47.2	48.7	-1.5	Retur
31	7.310M	29.2	+10.0 +0.0	+0.2 +0.1	+0.1 +0.1	+0.1	+0.0	39.8	50.0	-10.2	Retur
32	20.256M	28.9	+10.0 +0.0	+0.3 +0.2	+0.1 +0.2	+0.1	+0.0	39.8	50.0	-10.2	Retur
33	12.706M	28.9	+10.0 +0.0	+0.3 +0.1	+0.1 +0.2	+0.1	+0.0	39.7	50.0	-10.3	Retur
34	2.502M	25.0	+10.0 +0.0	+0.1 +0.1	+0.0 +0.1	+0.1	+0.0	35.4	46.0	-10.6	Retur
35	20.193M	28.3	+10.0 +0.0	+0.3 +0.2	+0.1 +0.2	+0.1	+0.0	39.2	50.0	-10.8	Retur
36	2.264M	24.8	+10.0 +0.0	+0.1 +0.1	+0.0 +0.1	+0.1	+0.0	35.2	46.0	-10.8	Retur
37	26.999M	27.8	+10.0 +0.0	+0.4 +0.2	+0.1 +0.2	+0.1	+0.0	38.8	50.0	-11.2	Retur
38	1.694M	24.3	+10.0 +0.0	+0.1 +0.1	+0.0 +0.1	+0.1	+0.0	34.7	46.0	-11.3	Retur
39	3.250M	24.1	+10.0 +0.0	+0.1 +0.1	+0.1 +0.1	+0.1	+0.0	34.6	46.0	-11.4	Retur
40	23.067M	27.4	+10.0 +0.0	+0.4 +0.2	+0.1 +0.2	+0.1	+0.0	38.4	50.0	-11.6	Retur
41	1.979M	24.0	+10.0 +0.0	+0.1 +0.1	+0.0 +0.1	+0.1	+0.0	34.4	46.0	-11.6	Retur

42	20.319M	27.3	+10.0 +0.0	+0.3 +0.2	+0.1 +0.2	+0.1	+0.0	38.2	50.0	-11.8	Retur
43	6.697M	27.6	+10.0 +0.0	+0.2 +0.1	+0.1 +0.1	+0.1	+0.0	38.2	50.0	-11.8	Retur
44	3.004M	23.8	+10.0 +0.0	+0.1 +0.1	+0.0 +0.1	+0.1	+0.0	34.2	46.0	-11.8	Retur
45	6.761M	27.5	+10.0 +0.0	+0.2 +0.1	+0.1 +0.1	+0.1	+0.0	38.1	50.0	-11.9	Retur
46	7.067M	27.3	+10.0 +0.0	+0.2 +0.1	+0.1 +0.1	+0.1	+0.0	37.9	50.0	-12.1	Retur
47	509.979k Ave	23.4	+10.0 +0.0	+0.0 +0.2	+0.0 +0.0	+0.2	+0.0	33.8	46.0	-12.2	Retur
^	509.966k	35.9	+10.0 +0.0	+0.0 +0.2	+0.0 +0.0	+0.2	+0.0	46.3	46.0	+0.3	Retur
49	2.753M	23.1	+10.0 +0.0	+0.1 +0.1	+0.0 +0.1	+0.1	+0.0	33.5	46.0	-12.5	Retur
50	4.407M	22.9	+10.0 +0.0	+0.2 +0.1	+0.1 +0.1	+0.1	+0.0	33.5	46.0	-12.5	Retur
51	13.562M	21.0	+10.0 +0.0	+0.3 +0.1	+0.1 +0.2	+0.1	+0.0	31.8	50.0 Fundamental w/ Load attached	-18.2	Retur
52	636.451k Ave	17.2	+10.0 +0.0	+0.0 +0.2	+0.0 +0.0	+0.1	+0.0	27.5	46.0	-18.5	Retur
^	636.500k	32.8	+10.0 +0.0	+0.0 +0.2	+0.0 +0.0	+0.1	+0.0	43.1	46.0	-2.9	Retur

Test Setup Photos

Appendix A: Modifications Made During Testing

Legend Values:
1.) 27mH Common Mode Choke
2.) 0.1uF Capacitor
3.a.) 2200pF Capacitor
3.b.) 2200pF Capacitor
3.c.) 2200pF Capacitor
4) Ground connection
5) AC line

Modifications Made: **Modification #1 includes all the modification listed below.**
1.) 27mH Common Mode Choke on input Line and Neutral going to the power supply section
2.) 0.1uF Capacitor between Line and Neutral (after choke)
3.a.) 2200pF Capacitor from floating rectified negative to Ground
3.b.) 2200pF Capacitor from floating rectified negative to Ground
3.c.) 2200pF Capacitor from floating rectified positive to Ground
4) Ground connection from low voltage section to case
5) AC Line routed away from under power supply primary

Appendix B: Manufacturer Declaration

The following model has been tested by CKC Laboratories: **HPS-01**

Since the time of testing, the manufacturer has chosen to use the following model name 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:
HPS1

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 dBµV/m, the spectrum analyzer reading in dBµV 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	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/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.