RETLIF TESTING LABORATORIES | Put Us To The Test℠
3131 Detwiler Road
Harleysville, PA 19438 USA
Tel: (215) 256-4133 • Fax: (215) 256-4130 • www.retlif.com

FCC Part 15, Subpart C
Test Report

On

RFID Module
FCC ID: ADG17688

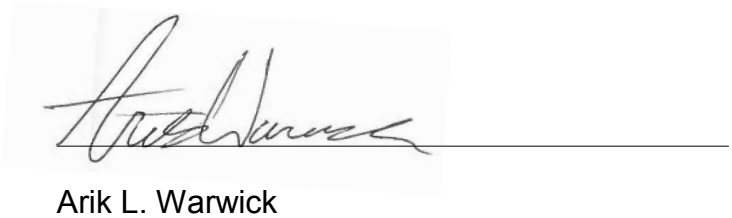
Customer Name:	GAI-Tronics Corporation
Customer P.O:	4504977808
Date of Report:	December 2, 2019
Test Report No:	R-3132P-1
Test Start Date:	October 17, 2019
Test Finish Date:	October 18, 2019
Test Technicians:	M. Nowak, S. Macdonald
Approved By:	D. Rybicki
Report Prepared By:	P. Harris

Table of Contents

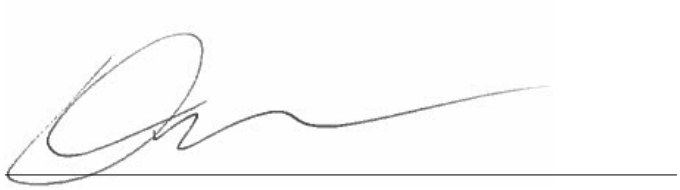
List of Tables

Certification and Signatures

We certify that this report is a true representation of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.



Arik L. Warwick
EMC Test Engineer



David M. Rybicki
Laboratory Supervisor

Non-Warranty Provision
The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

Non-Endorsement
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This test report may not be used by the client to claim product endorsement by ANSI National Accreditation Board (ANAB).

Technical Information

Report Number:	R-3132P-1
Applicant:	GAI-Tronics Corporation
	3030 Kutztown Road
	Reading, PA 19605
Manufacturer:	GAI-Tronics Corporation
Manufacturer Address:	3030 Kutztown Road
	Reading, PA 19605
Test Sample:	RFID Module
Part Number:	69688-001
Model Number:	17688
Power Requirements:	5 VDC
Frequency of Operation:	125 kHz, 13.56 MHz
Antenna Type:	13.56 – PCB Embedded, 3 Turn, 900 nH Inductance; 125 kHz – Wire Loop
Equipment Use:	RFID Tag Reader Module
Equipment Class:	DXX

Test Specification:
FCC Rules and Regulations Part 15, Subpart C, Section 15.225

Test Procedure:
ANSI C63.10: 2013

Test Facility:
Retlif Testing Laboratories
3131 Detwiler Road
Harleysville, PA 19438

FCC Registered Test Site Number: 98314

EUT Description/Installation:
The EUT is an RFID Module intended to be installed exclusively in GAI-Tronics HUBBCOM devices.

Tests Performed

The test methods performed on the RFID Module are shown below:

Table 1 - Test Methods Performed

FCC Part 15, Subpart C	Test Method
15.225(a)	Field Strength of Fundamental
15.225(b)(c)(d)	Field Strength of Spurious, Out of Band/Band Edge Emissions
15.225(e)	Frequency Tolerance
15.207(a)	Conducted Emissions, 150 kHz to 30 MHz

General Test Requirements

1. The measurement procedures of ANSI C63.10:2013 were utilized as specified in FCC Part 15, Subpart C, Section 15.31(a)(3).
2. All measurements were performed at a 3 meter test distance.
3. The EUT was rotated 360 degrees for all radiated measurements.
4. All readily accessible EUT controls were adjusted in such a manner as to maximize the level of emissions in accordance with FCC Section 15.31(g).

Requirements and Test Results

Requirement:
FCC Section 15.225 (a), Field Strength of Fundamental

FCC Section 15.225(a) – The field strength of any emission within the band 13.553 MHz – 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Field Strength Measurement & Calculation:

The following settings were used:

RBW = 1 MHz for f ≥ 1 GHz, 120 kHz for f ≤ 1 GHz

VBW ≥ RBW

Detector Function = Quasi-Peak

The maximized field strength of the emission was calculated as follows:

$$F_C = M_R + C_F$$

Where:
F_C = Corrected Field Strength Reading in dBµV/m
M_R = Uncorrected Meter Reading in dBµV
C_F = Correction Factor in dB (Pre-Amp + Antenna Factor + Cable Loss + Distance Factor)

For frequencies below 30 MHz a distance factor of -40dB/decade was utilized

Requirements and Test Results (con't)

15.225 (a) Field Strength of Fundamental, Radiated Emissions Measurement Procedure

The field strength of the fundamental emission was measured with a spectrum analyzer or EMI Receiver. The EUT was placed on an 80cm high wooden test stand located 3 meters from the test antenna on a FCC listed open area test site. Emissions from the EUT were maximized by re-orientating the test sample, rotating the test sample 360 degrees, changing the orientation of the receive antenna and raising and lowering the test antenna from 1 – 4 meters. The maximized field strength of each observed emission was measured, recorded and compared to the specified limits of 15.225(a) as appropriate.

Results: The maximized measured field strength of the fundamental emission was below the specified test limit of 15.225(a). See test data.

Requirement:
FCC Section 15.225 (d) - The field strength of any emission outside the 13.553 MHz – 13.567 MHz band shall not exceed the general radiated limits of 15.209 as shown in Table 2 below.

Table 2 - Test Limits, Field Strength of Out of Band Emissions

Fundamental Frequency (MHz)	Field Strength of Fundamental microvolts/meter	Measurement Distance
0.009 to 0.490	2400/F(kHz)	300
0.490 to 1.705	24000/F(kHz)	30
1.705 to 30.0	30	30
30.0 to 88.0	100	3
88.0 to 216.0	150	3
216.0 to 960.0	200	3
Above 960.0	500	3

Requirements and Test Results (con't)

FCC Section 15.225 (d), Radiated Emissions Measurement

The field strength of radiated emissions were measured with a spectrum analyzer or EMI Receiver. The EUT was placed on an 80cm high wooden test stand located 3 meters from the test antenna on a FCC listed open area test site. Emissions from the EUT were maximized by re-orientating the test sample, rotating the test sample 360 degrees, changing the polarization/orientation of the test antenna and raising and lowering the test antenna from 1 – 4 meters. The maximized field strength of each observed emission was measured, recorded and compared to the specified limits of 15.209. When necessary, the marker/delta method was used to verify bandedge compliance.

- **Results**: The maximized measured field strength of the radiated emissions were below the specified test limits of 15.225(b)(c)(d)/15.209. See test data.

Requirement:
FCC Section 15.225 (e) Frequency Tolerance

The frequency tolerance of the carrier signal must be maintained within ±0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage.

Frequency Tolerance Measurement Procedure

The EUT was placed in a temperature chamber. An antenna was connected to a spectrum analyzer and placed outside the chamber. The EUT's RF output frequency was measured and recorded at the input voltages and temperatures shown in Table 3 below:

Table 3 - Frequency Tolerance Input Voltage and Temperatures

Input Voltage	Temperature
5 VDC	Ambient
5 VDC	-20 °C
5 VDC	50 °C
5 VDC	20 °C
4.25 VDC	20 °C
5.75 VDC	20 °C

- **Results:** The frequency tolerance of the EUT was in compliance with the specified requirements of 15.225(e). See test data.

Requirements and Test Results (con't)

Requirement:
FCC Section 15.207(a), Conducted Emissions

For an intentional radiator that is 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 within the band 150 kHz to 30 MHz shall not exceed the limits shown below as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of the paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Devices that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

Table 4 - Conducted Emission Limits

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50
*Decreases with the logarithm of the frequency		

Conducted Emissions Measurement Procedure

The EUT and associated cabling was placed on a 0.8 m high non-conductive test stand above the horizontal ground plane. The horizontal ground plane extended at least 0.5 m beyond the boundary of the equipment under test, and had a minimum size of 2.0 m x 2.0 m. The 0.8 m test stand was positioned such that the distance between the EUT and the vertical reference plane was 0.4 m. The LISN was located so that its closest surface was no less than 0.8 m from the nearest boundary of the equipment under test.

Each current carrying conductor of the EUT's power cord was then connected to a 50 ohm/50 μH LISN. The LISN was mounted to the ground plane in a position that produced a minimum distance of 0.8 m between the EUT and the LISN.

The RF port of the LISN was connected to the test receiver by means of 50 Ohm coaxial cable.

- **Results**:
  The conducted emissions observed from the EUT did not exceed the limits specified in 15.207(a).

Equipment Lists

FCC Section 15.225(a) – Field Strength of Fundamental

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
3207	ETS / EMCO	ANTENNA, ACTIVE LOOP	9 kHz - 30 MHz	6502	5/13/2019	5/31/2020
8079	ROHDE & SCHWARZ	RECEIVER, EMI	9 kHz - 30 MHz	ESH3	6/19/2019	6/30/2020
8300	RETLIF	OPEN AREA TEST SITE, ATTENUATION	3/10 Meter OATS	RPA	3/28/2018	3/31/2020
8300C	UNKNOWN	CABLE, COAXIAL	3/10 METER	3 METER CABLE	8/15/2019	2/29/2020
8637	AGILENT/HP	ANALYZER, SPECTRUM	30 Hz - 26.5 GHz	8563E	7/9/2019	7/31/2020
8668	DIGI-SENSE	HYGROMETER	0 - 50 deg. c, 10 - 90 % RH	20250-31	9/24/2019	3/31/2020

FCC Section 15.225(d) & 15.209 – Field Strength of Spurious and Out of Band Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
127A	ETS / EMCO	ANTENNA, BICONICAL	20 - 200 MHz	3104	5/6/2019	11/30/2020
3207	ETS / EMCO	ANTENNA, ACTIVE LOOP	9 kHz - 30 MHz	6502	5/13/2019	5/31/2020
8016	ETS / EMCO	ANTENNA, LOG PERIODIC	200 MHz - 1 GHz	3146	9/9/2019	3/31/2021
8047	CMT	PRE-AMPLIFIER	100 kHz - 1 GHz	LF51104N	3/28/2019	3/31/2020
8079	ROHDE & SCHWARZ	RECEIVER, EMI	9 kHz - 30 MHz	ESH3	6/19/2019	6/30/2020
8080	ROHDE & SCHWARZ	RECEIVER, EMI	20 - 1300 MHz	354-3000.56ESVP	10/30/2018	10/31/2019
8300	RETLIF	OPEN AREA TEST SITE, ATTENUATION	3/10 Meter OATS	RPA	3/28/2018	3/31/2020
8300C	UNKNOWN	CABLE, COAXIAL	3/10 METER	3 METER CABLE	8/15/2019	2/29/2020
8637	AGILENT/HP	ANALYZER, SPECTRUM	30 Hz - 26.5 GHz	8563E	7/9/2019	7/31/2020
8668	DIGI-SENSE	HYGROMETER	0 - 50 deg. c, 10 - 90 % RH	20250-31	9/24/2019	3/31/2020
8685	RETLIF	CABLE, COAXIAL	10 kHz - 18 GHz	3' TYPE N	2/15/2019	2/29/2020

FCC Section 15.225(e) – Frequency Tolerance

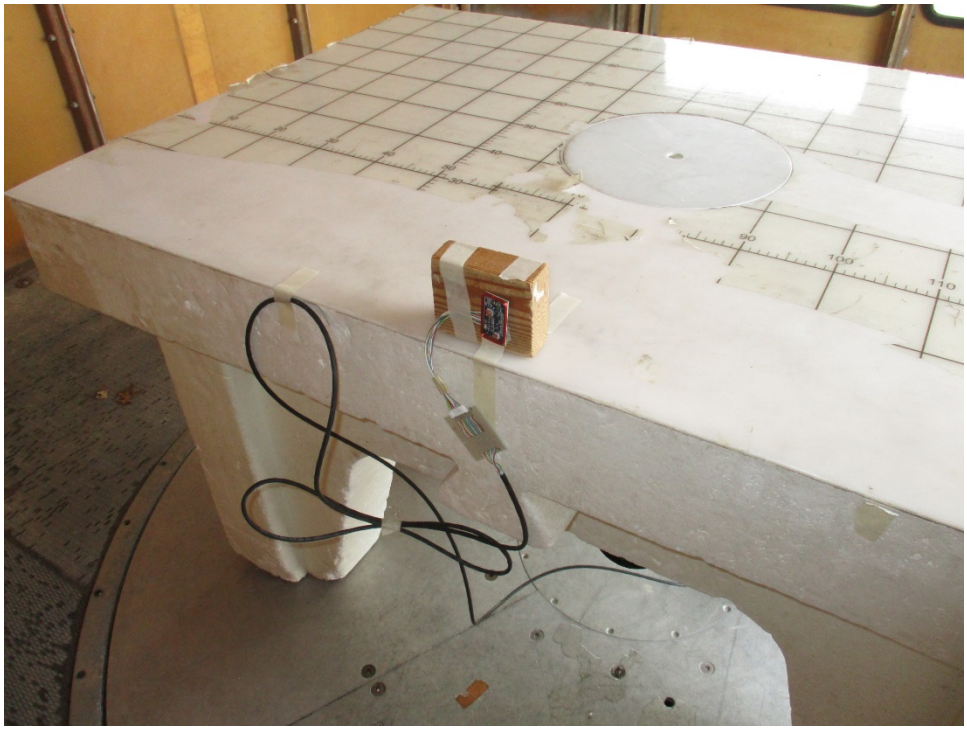
EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
8320	ASSOCIATED ENVIRONMENTAL	CHAMBER, TEMPERATURE	- 50 - 150 deg. C	ZFD-531	12/6/2018	12/31/2019
8322	ETS / EMCO	ANTENNA, LOOP	10 KHz - 30 MHz	6512	4/18/2018	4/30/2020
8525	POWER DESIGNS	POWER SUPPLY, DC	1 - 32VDC, 0 - 600ma	3206	Calibrate Before Use	
8749	RIGOL	ANALYZER, SPECTRUM	9 kHz - 3.2 GHz	DSA832E	5/21/2019	5/31/2020
957	FLUKE	MULTIMETER, DIGITAL	True RMS Multimeter	115	6/24/2019	6/30/2020

FCC Section 15.207– Conducted Emissions, 150 kHz to 30 MHz

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
8079	ROHDE & SCHWARZ	RECEIVER, EMI	9 kHz - 30 MHz	ESH3	6/19/2019	6/30/2020
8366A	RETLIF	CABLE, COAXIAL	10 KHz - 1 GHz	20' BNC	5/7/2019	5/31/2020
8496	NARDA MICROWAVE	ATTENUATOR, COAXIAL	10 dB, DC - 11 GHz, 20 W	768-10	6/11/2019	6/30/2020
8619	OMEGA	HYGROMETER	-20 to 70 deg. C, 0-99% RH	OM-73	9/24/2019	3/31/2020
8633	SOLAR ELECTRONICS	LISN	50 uH, 150 kHz - 30 MHz	21106-50-BP-25-BNC	6/7/2019	6/30/2020
8634	SOLAR ELECTRONICS	LISN	50 uH, 150 kHz - 30 MHz	21106-50-BP-25-BNC	6/7/2019	6/30/2020
8750	RIGOL	ANALYZER, SPECTRUM	9 kHz - 3.2 GHz	DSA832E	5/21/2019	5/31/2020

Test Photographs
Field Strength of Fundamental
FCC Part 15, Subpart C, Section 15.225(a)

Test Photographs
Field Strength of Fundamental



EUT Configuration

Test Photographs
Field Strength of Fundamental

Test Setup, 9 kHz to 30 MHz, Parallel

Test Setup, 9 kHz to 30 MHz, Perpendicular

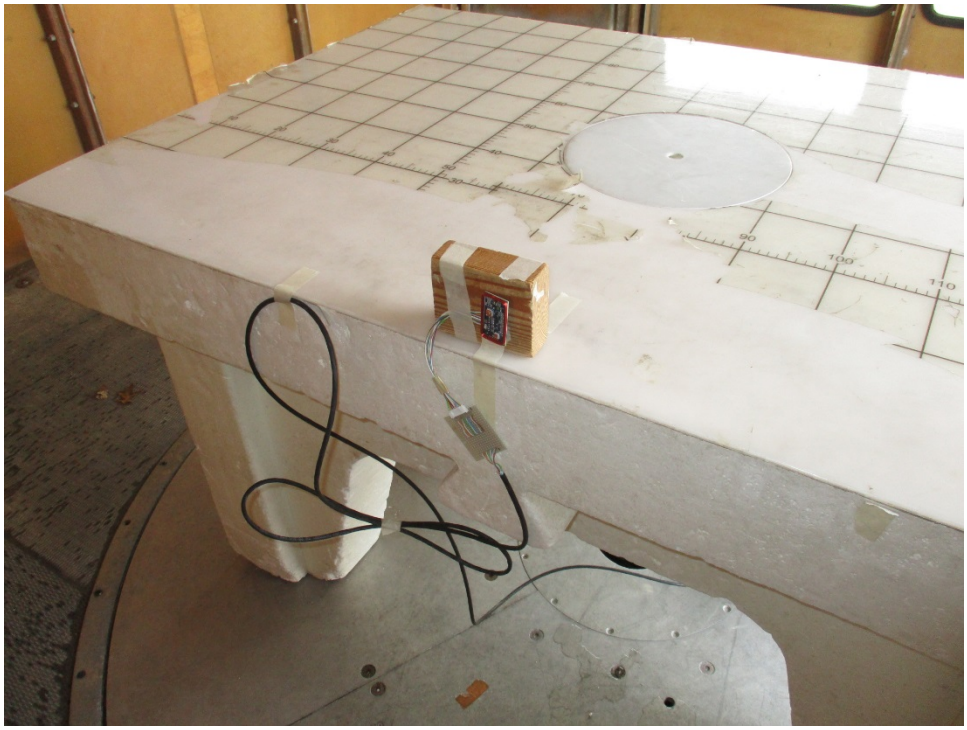
FCC Part 15, Subpart C, Section 15.225(a)
Operation within the band 13.110-14.010 MHz
Test Data, Field Strength of Fundamental

EMISSIONS TEST DATA SHEET	
Test Specification:	FCC Part 15, Subpart C, Section 15.225(a), Operation within the band 13.110-14.010 MHz
Method:	ANSI C63.10, Section 6, Standard Test Methods
Job Number/Customer:	R – 3132P-1 / GAI-Tronics Corporation
Test Sample:	RFID Module
Part Number:	69688-001
Operating Mode:	Continuously Transmitting 13.56MHz signal
Technician:	M. Nowak
Date(s):	10/17/19
Temperature:	11.0 ºC
Relative Humidity:	50 %
Detector:	Quasi-Peak
Test Distance:	3m (Converted to 30m via 1/d)
Notes: The emissions observed from the EUT do not exceed the specified limits.	

Frequency	Antenna Pol / Height	EUT Orientation	QP Meter Reading @ 3 m	Correction Factor	Corrected Reading @ 3 m	Distance Correction (3 to 30 m)	Corrected Reading @ 30 m	Converted Reading @ 30 m	QP Limit @ 30 m
MHz	Par/Perp / m	Degrees	dBuV	dB	dBuV/m	dB	dBuV/m	uV/m	uV/m
13.562	Par / 1.00	174.2	41.9	10.5	52.4	-20.0	32.4	41.69	15,848
13.562	Perp / 1.00	228.0	38.7	10.5	49.2	-20.0	29.2	28.84	15,848

Test Photographs
Field Strength of Spurious and Out of Band Emissions
FCC Part 15, Subpart C, Section 15.209

Test Photographs
Field Strength of Spurious and Out of Band Emissions



EUT Configuration

Test Photographs
Field Strength of Spurious and Out of Band Emissions

Test Setup, 9 kHz to 30 MHz, Parallel

Test Setup, 9 kHz to 30 MHz, Perpendicular

Test Photographs
Field Strength of Spurious and Out of Band Emissions

Horizontal Antenna Polarization, 30 to 200 MHz

Vertical Antenna Polarization, 30 to 200 MHz

Test Photographs
Field Strength of Spurious and Out of Band Emissions

Horizontal Antenna Polarization, 200 MHz to 1 GHz

Vertical Antenna Polarization, 200 MHz to 1 GHz

FCC Part 15, Subpart C, Section 15.209
Test Data, Field Strength of Spurious and Out of Band Emissions, 9 kHz to 1 GHz

EMISSIONS TEST DATA SHEET	
Test Specification:	FCC Part 15, Subpart C, Section 15.209, Radiated Emissions
Method:	ANSI C63.10, Section 6, Standard Test Methods, 9 kHz to 1 GHz
Job Number/Customer:	R – 3132P-1 / GAI-Tronics Corporation
Test Sample:	RFID Module
Part Number:	69688-001
Operating Mode:	Continuously Transmitting 125 kHz signal
Technician:	M. Nowak
Date(s):	10/17/19
Temperature:	11.0 ºC
Relative Humidity:	50 %
Detector:	Quasi-peak
Test Distance:	3m

Notes: The frequency range was scanned from 9 kHz to 30 MHz
The emissions observed from the EUT do not exceed the specified limits. The two highest readings relative to the limit are presented.
*Noise floor measurement, minimum sensitivity of measurement system.

Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted to 300m	Converted Reading	Limit at 300m
MHz	(Par/Perp) / Height	Degrees	dBuV	dB	dBuV/m	dBuV/m	uV/m	uV/m
0.009								266.67
|								|
0.125	Par / 1.00	170.6	53.2	11.6	64.8	-40	17.38	19.2
0.125	Perp / 1.00	130.8	44.4	11.6	56.0	-40	6.31	19.2
|								|
0.490								4.89
Frequency	**Antenna Position**	**EUT Orientation**	**Meter Reading**	**Correction Factor**	**Corrected Reading**	**Converted to 30m**	**Converted Reading**	**Limit at 30m**
MHz	**(Par/Perp) / Height**	**Degrees**	**dBuV**	**dB**	**dBuV/m**	**dBuV/m**	**uV/m**	**uV/m**
0.490								48.98
|								|
1.705								14.08
1.705								30.00
|								|
*14.80	Par / 1.00	180.0	13.5	10.5	24.0	-	15.85	|
|								|
*25.00	Par / 1.00	180.0	5.6	7.8	13.4	-	4.68	|
|								|
30.00								30.00

EMISSIONS TEST DATA SHEET

Test Specification:	FCC Part 15, Subpart C, Section 15.209, Radiated Emissions
Method:	ANSI C63.10, Section 6, Standard Test Methods, 9 kHz to 1 GHz
Job Number/Customer:	R – 3132P-1 / GAI-Tronics Corporation
Test Sample:	RFID Module
Part Number:	69688-001
Operating Mode:	Continuously Transmitting 125kHz signal
Technician:	M. Nowak
Date(s):	10/17/19
Temperature:	11.0 ºC
Relative Humidity:	50 %
Detector:	Quasi-peak
Test Distance:	3m

Notes: The frequency range was scanned from 30 MHz to 1 GHz
The emissions observed from the EUT do not exceed the specified limits. The six highest readings relative to the limit are presented.
*Noise floor measurement, minimum sensitivity of measurement system,

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
MHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
30.00							100
*33.00	H / 1.00	180.0	4.6	12.3	16.9	7.00	
88.00							100
88.00							150
216.00							150
216.00							200
240.00	H / 1.60	153.1	23.0	14.1	37.1	71.62	
240.00	V / 1.00	173.0	28.4	14.1	42.5	133.36	
264.00	H / 1.34	182.5	19.4	15.2	34.6	53.71	
264.00	V / 1.87	224.2	20.6	15.2	35.8	61.66	
288.00	H / 1.27	199.1	19.6	16.5	36.1	63.83	
288.00	V / 1.36	156.0	22.6	16.5	39.1	90.16	
360.00	H / 1.84	193.3	18.9	17.7	36.6	67.61	
360.00	V / 1.00	138.6	15.0	17.7	32.7	43.16	
480.00	H / 1.00	163.5	14.9	21.1	36.0	63.10	
480.00	V / 1.51	131.8	14.3	21.1	35.4	58.89	
960.00							200
960.00							500
1000.00							500

EMISSIONS TEST DATA SHEET	
Test Specification:	FCC Part 15, Subpart C, Section 15.209, Radiated Emissions
Method:	ANSI C63.10, Section 6, Standard Test Methods, 9 kHz to 1 GHz
Job Number/Customer:	R – 3132P-1 / GAI-Tronics Corporation
Test Sample:	RFID Module
Part Number:	69688-001
Operating Mode:	Continuously Transmitting 13.56 MHz signal
Technician:	M. Nowak
Date(s):	10/17/19
Temperature:	11.0 ºC
Relative Humidity:	50 %
Detector:	Quasi-peak
Test Distance:	3m

Notes: The frequency range was scanned from 9 kHz to 30 MHz
The emissions observed from the EUT do not exceed the specified limits. The two highest readings relative to the limit are presented.
*Noise floor measurement, minimum sensitivity of measurement system.

Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted to 300m	Converted Reading	Limit at 300m
MHz	(Par/Perp) / Height	Degrees	dBuV	dB	dBuV/m	dBuV/m	uV/m	uV/m
0.009								266.67
|								|
0.490								4.89

Frequency	Antenna Position	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted to 30m	Converted Reading	Limit at 30m
MHz	(Par/Perp) / Height	Degrees	dBuV	dB	dBuV/m	dBuV/m	uV/m	uV/m
0.490								48.98
|								|
1.705								14.08
1.705								30.00
|								|
*14.80	Par / 1.00	180.0	13.5	10.5	24.0	-	15.85	|
|								|
*25.00	Par / 1.00	180.0	5.6	7.8	13.4	-	4.68	|
|								|
30.00								30.00

EMISSIONS TEST DATA SHEET

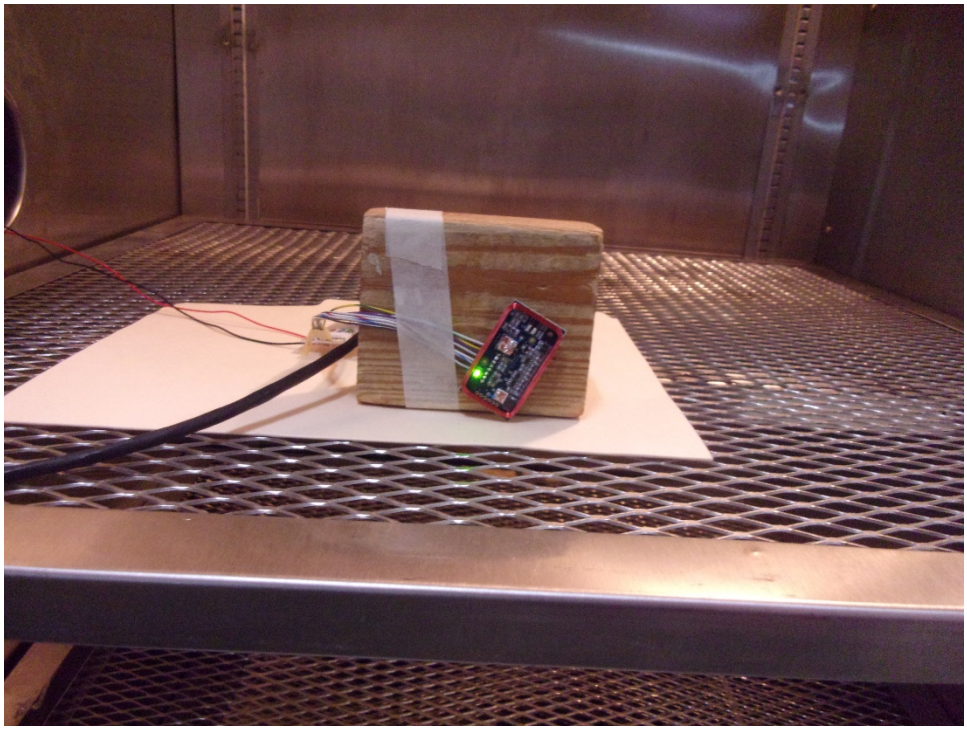
Test Specification:	FCC Part 15, Subpart C, Section 15.209, Radiated Emissions
Method:	ANSI C63.10, Section 6, Standard Test Methods, 9 kHz to 1 GHz
Job Number/Customer:	R – 3132P-1 / GAI-Tronics Corporation
Test Sample:	RFID Module
Part Number:	69688-001
Operating Mode:	Continuously Transmitting 13.56 MHz signal
Technician:	M. Nowak
Date(s):	10/17/19
Temperature:	11.0 ºC
Relative Humidity:	50 %
Detector:	Quasi-peak
Test Distance:	3m

Notes: The frequency range was scanned from 30 MHz to 1 GHz
The emissions observed from the EUT do not exceed the specified limits. The six highest readings relative to the limit are presented.
*Noise floor measurement, minimum sensitivity of measurement system

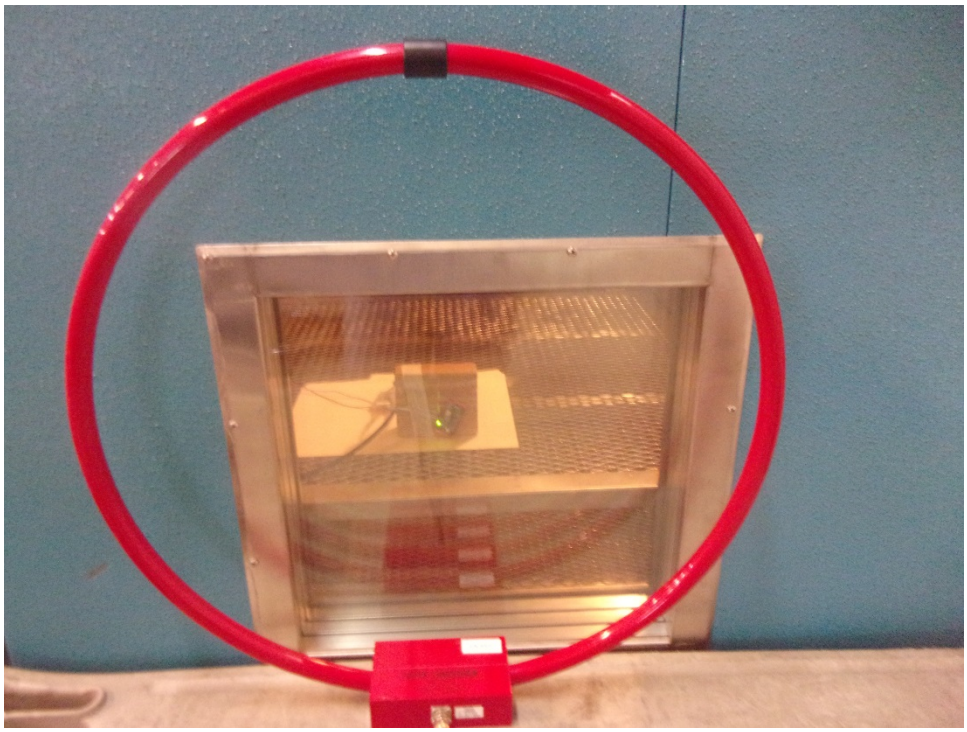
Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
MHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
30.00							100
*33.00	H / 1.00	180.0	4.6	12.3	16.9	7.00	
88.00							100
88.00							150
216.00							150
216.00							200
240.00	H / 1.60	153.1	23.0	14.1	37.1	71.62	
240.00	V / 1.00	173.0	28.4	14.1	42.5	133.36	
264.00	H / 1.34	182.5	19.4	15.2	34.6	53.71	
264.00	V / 1.87	224.2	20.6	15.2	35.8	61.66	
288.00	H / 1.27	199.1	19.6	16.5	36.1	63.83	
288.00	V / 1.36	156.0	22.6	16.5	39.1	90.16	
360.00	H / 1.84	193.3	18.9	17.7	36.6	67.61	
360.00	V / 1.00	138.6	15.0	17.7	32.7	43.16	
480.00	H / 1.00	163.5	14.9	21.1	36.0	63.10	
480.00	V / 1.51	131.8	14.3	21.1	35.4	58.89	
960.00							200
960.00							500
1000.00							500

Test Photographs
Frequency Tolerance
FCC Part 15, Subpart C, Section 15.225(e)

Test Photographs
Frequency Tolerance



EUT Configuration



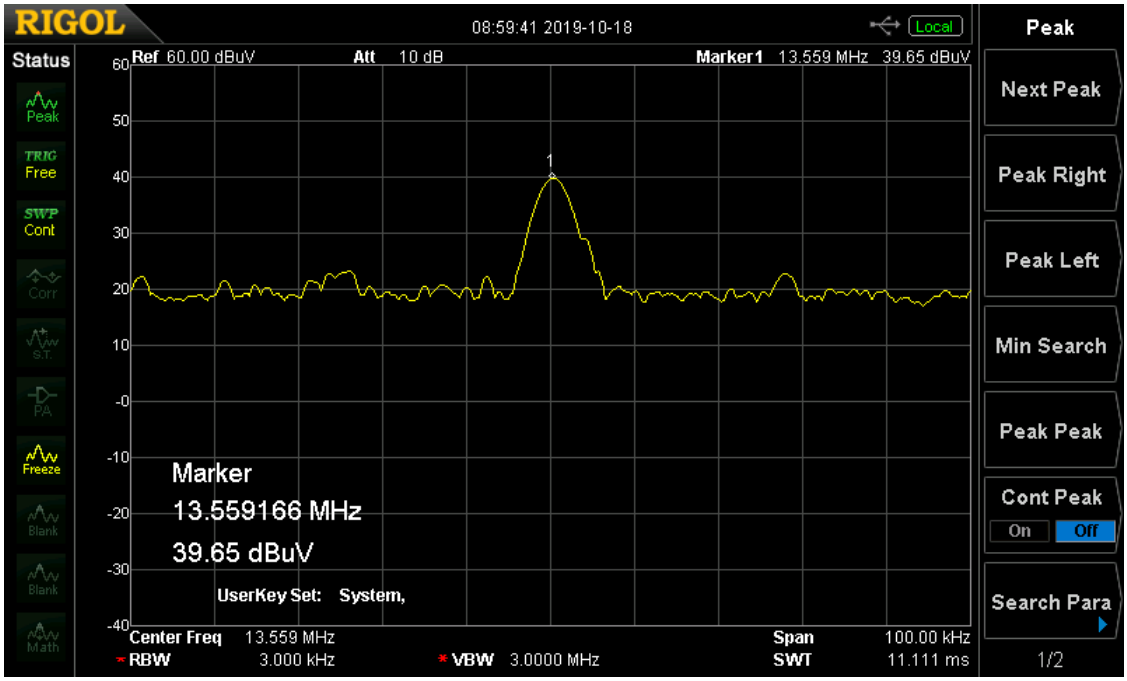
Antenna Configuration

FCC Section 15.255(e)
Test Data, Frequency Tolerance

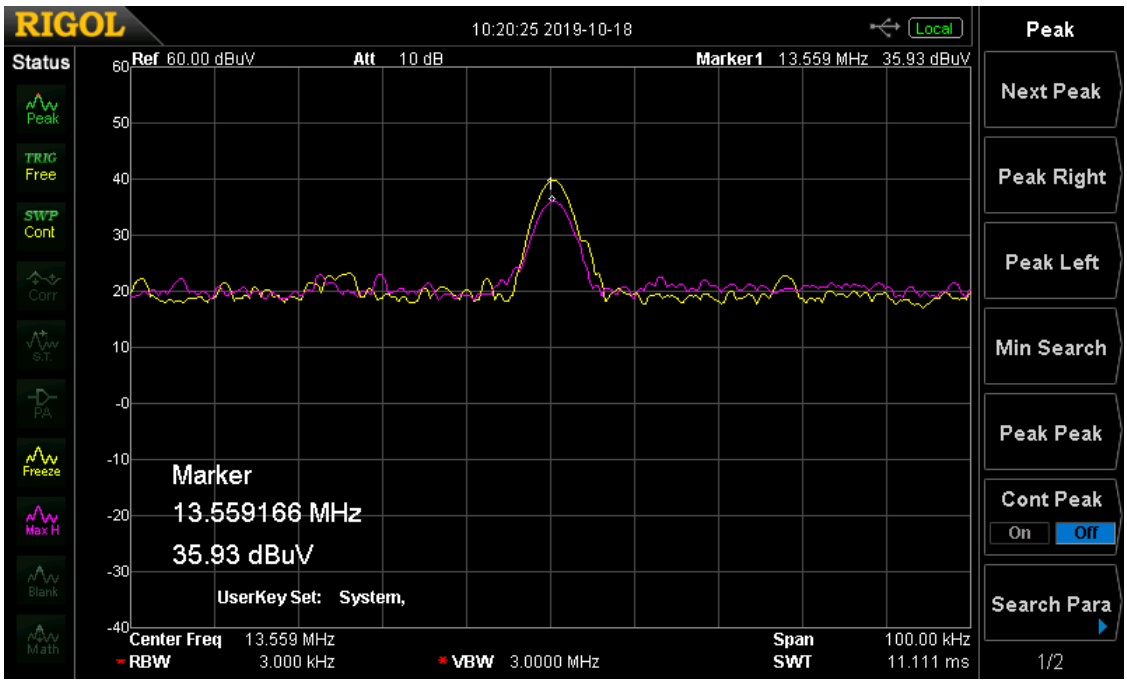
DATA SHEET	
Test Specification:	FCC Part 15.225 (e), Frequency Tolerance
Job Number:	R- 3132P-1
Customer:	GAI-Tronics Corp
Test Sample:	RFID Module
Model Number:	69688-001
Operating Mode:	Continuously Transmitting 13.56MHz signal
Technician:	M. Nowak / D. Rybicki
Date(s):	10/18/19
Test Result:	Complied

Input Voltage	Temperature	Center Frequency
5 VDC	Ambient	13.559 MHz
5 VDC	-20 °C	13.559 MHz
5 VDC	50 °C	13.559 MHz
5 VDC	20 °C	13.559 MHz
4.25 VDC	20 °C	13.559 MHz
5.75 VDC	20 °C	13.559 MHz

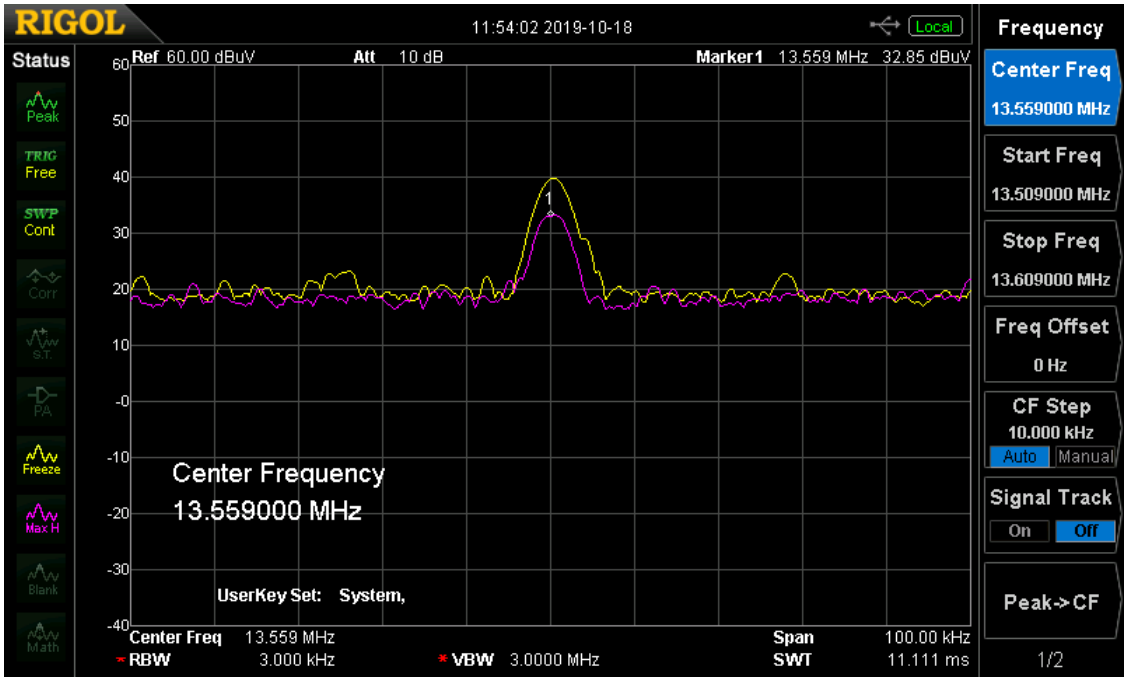
Notes:



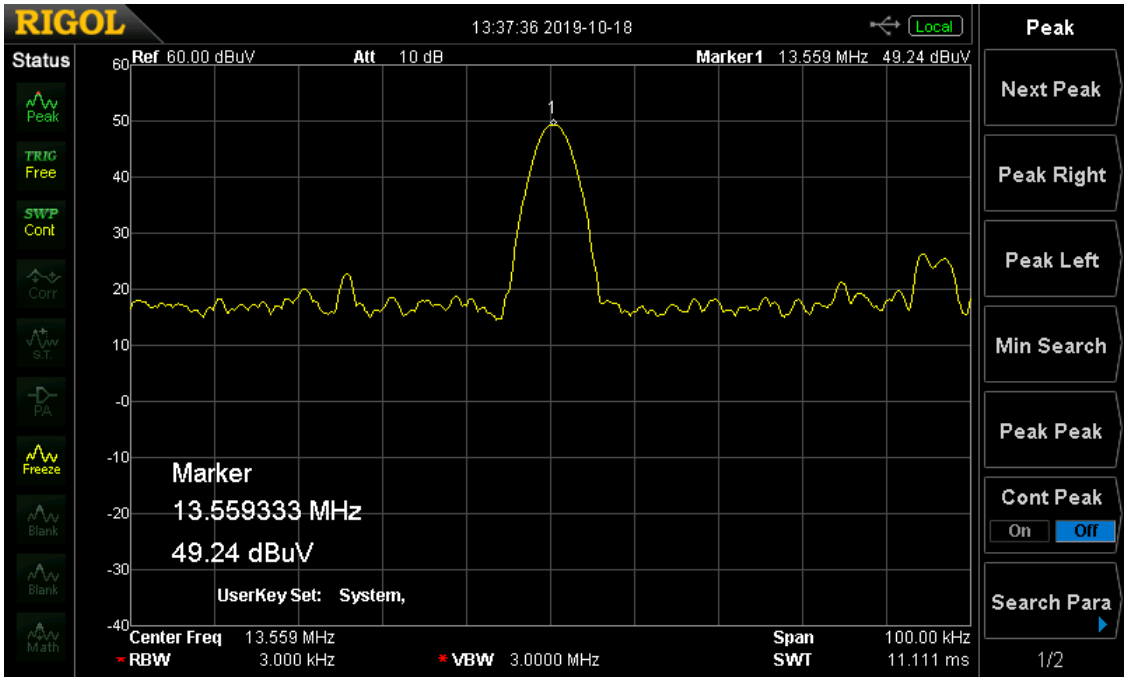
5 VDC, Ambient Temperature



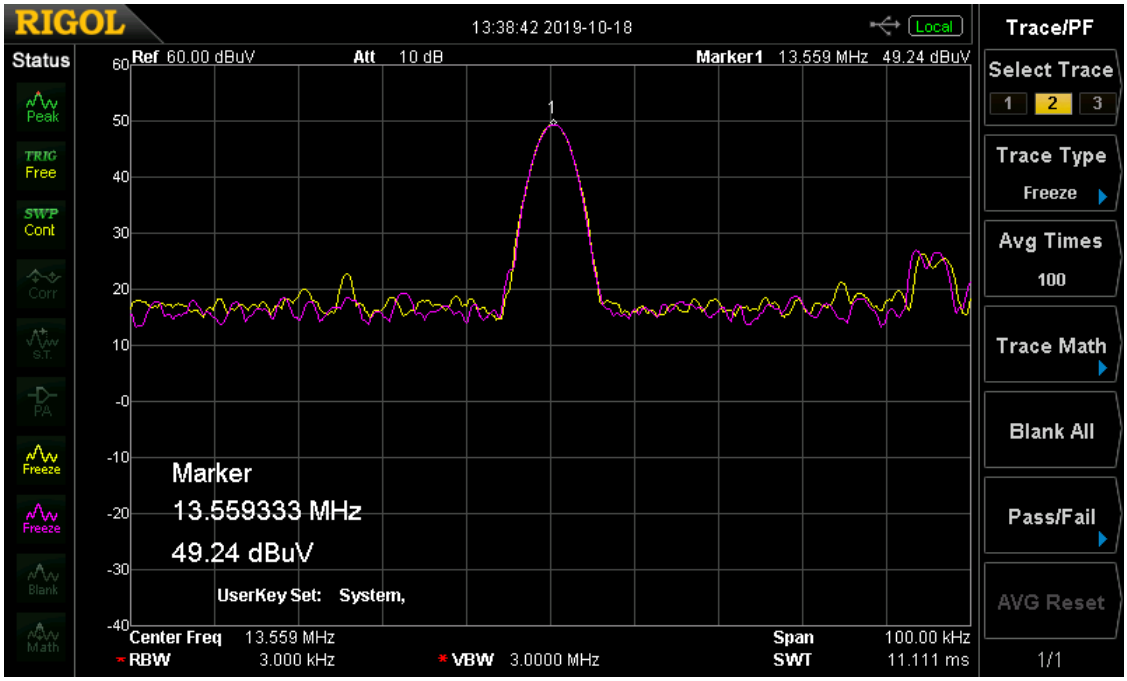
5 VDC, -20 °C



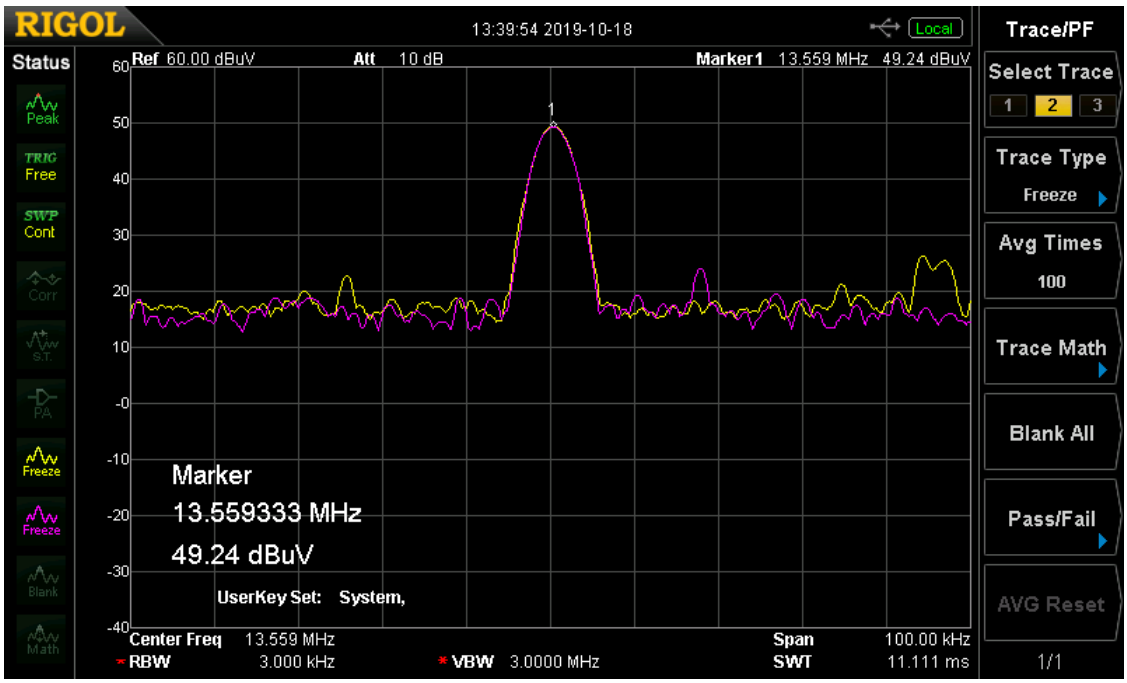
5 VDC, 50 °C



5 VDC, 20 °C



4.25 VDC, 20 °C



5.75 VDC, 20 °C

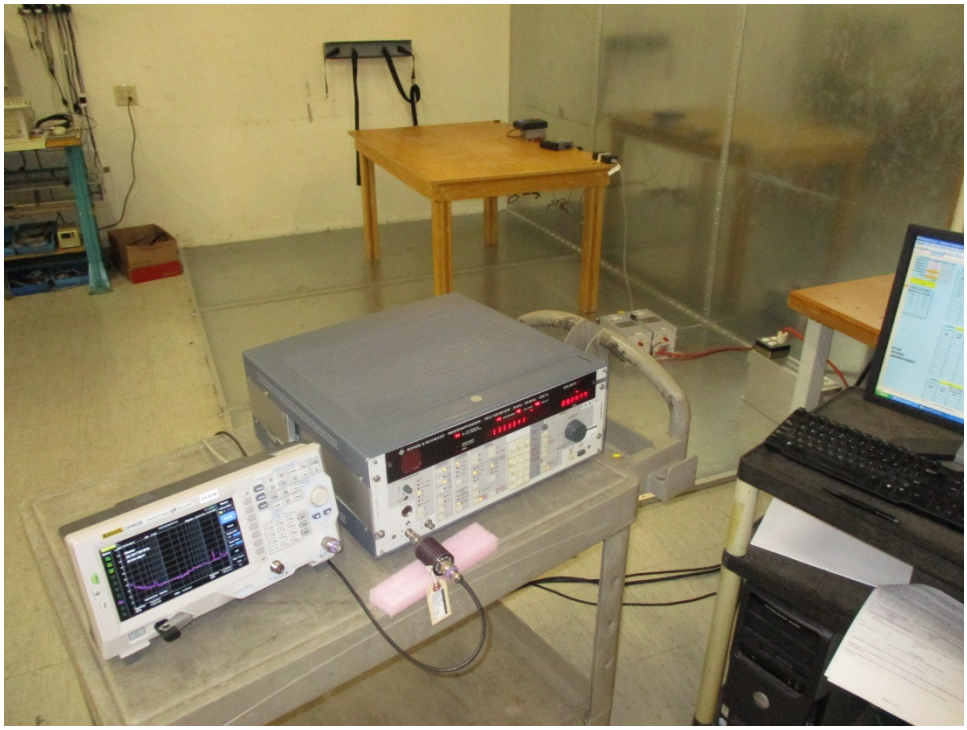
Test Photographs
Conducted Emissions, 150 kHz to 30 MHz
FCC Section 15.207(a)

Test Photographs
Conducted Emissions, 150 kHz to 30 MHz

Test Configuration, Hot

Test Configuration, Neutral

Test Photographs
Conducted Emissions, 150 kHz to 30 MHz



Test Setup

FCC Section 15.207(a)
Test Data, Conducted Emissions, 150 kHz to 30 MHz

EMISSIONS TEST DATA SHEET	
Test Specification:	FCC Part 15, Subpart C, Section 15.207(a), Conducted Emissions
Method:	ANSI C63.10, Section 6.2, AC Power-Line Conducted Emissions from Unlicensed Wireless Devices
Job Number/Customer:	R-3132P-1 / GAI-Tronics Corporation
Test Sample:	RFID Module
Model Number:	69688-001
Operating Mode:	Continuously Transmitting 13.56 MHz signal
Technician:	S. Macdonald
Date(s):	10/18/19
Temperature:	21.3 ºC
Relative Humidity:	38.1 %
Lead Tested:	115 VAC, 60 Hz, Hot

The frequency range was scanned from 0.15 MHz to 30 MHz.
The six highest emissions relative to the limit are presented.
The emissions observed from the EUT do not exceed the specified limits.

Frequency	Detector	Meter Reading	Total Correction Factor	Corrected Reading	Limit	Margin
MHz	–	dBµV	dB	dBµV	dBµV	dB
0.1535	Peak	44.6	10.2	54.8*	–	–
0.1535	Quasi-Peak	37.7	10.2	47.9	65.8	17.9
0.1535	Average	31.9	10.2	42.1	55.8	13.7
0.2502	Peak	27.6	10.2	37.8*	–	–
0.2502	Quasi-Peak	19.5	10.2	29.7	61.8	32.1
0.2502	Average	11.4	10.2	21.6	51.8	30.2
0.5405	Peak	26.0	10.2	36.2*	–	–
0.5405	Quasi-Peak	21.0	10.2	31.2	56.0	24.8
0.5405	Average	14.3	10.2	24.5	46.0	21.5
13.7755	Peak	20.0	10.5	30.5*	–	–
13.7755	Quasi-Peak	9.8	10.5	20.3	60.0	39.7
13.7755	Average	5.3	10.5	15.8	50.0	34.2
20.8853	Peak	24.0	10.6	34.6*	–	–
20.8853	Quasi-Peak	16.8	10.6	27.4	60.0	32.6
20.8853	Average	11.9	10.6	22.5	50.0	27.5
28.2077	Peak	20.6	10.6	31.2*	–	–
28.2077	Quasi-Peak	12.6	10.6	23.2	60.0	36.8
28.2077	Average	8.0	10.6	18.6	50.0	31.4

* Peak measurements are recorded for informational purposes only.

EMISSIONS TEST DATA SHEET

Test Specification:	FCC Part 15, Subpart C, Section 15.207(a), Conducted Emissions
Method:	ANSI C63.10, Section 6.2, AC Power-Line Conducted Emissions from Unlicensed Wireless Devices
Job Number/Customer:	R-3132P-1 / GAI-Tronics Corporation
Test Sample:	RFID Module
Model Number:	69688-001
Operating Mode:	Continuously Transmitting 13.56MHz signal
Technician:	S. Macdonald
Date(s):	10/18/19
Temperature:	21.3 ºC
Relative Humidity:	38.1 %
Lead Tested:	115 VAC, 60 Hz, Hot

The frequency range was scanned from 0.15 MHz to 30 MHz.
The six highest emissions relative to the limit are presented.
The emissions observed from the EUT do not exceed the specified limits.

Frequency	Detector	Meter Reading	Total Correction Factor	Corrected Reading	Limit	Margin
MHz	–	dBµV	dB	dBµV	dBµV	dB
0.1500	Peak	45.0	10.2	55.2*	–	–
0.1500	Quasi-Peak	37.6	10.2	47.8	66.0	18.2
0.1500	Average	29.6	10.2	39.8	56.0	16.2
0.1742	Peak	41.1	10.2	51.3*	–	–
0.1742	Quasi-Peak	34.4	10.2	44.6	64.8	20.2
0.1742	Average	25.4	10.2	35.6	54.8	19.2
0.5354	Peak	27.0	10.2	37.2*	–	–
0.5354	Quasi-Peak	22.6	10.2	32.8	56.0	23.2
0.5354	Average	15.8	10.2	26.0	46.0	20.0
13.7755	Peak	20.8	10.5	31.3*	–	–
13.7755	Quasi-Peak	13.3	10.5	23.8	60.0	36.2
13.7755	Average	9.3	10.5	19.8	50.0	30.2
19.8203	Peak	21.3	10.6	31.9*	–	–
19.8203	Quasi-Peak	14.5	10.6	25.1	60.0	34.9
19.8203	Average	9.9	10.6	20.5	50.0	29.5
29.4701	Peak	23.3	10.6	33.9*	–	–
29.4701	Quasi-Peak	16.2	10.6	26.8	60.0	33.2
29.4701	Average	12.0	10.6	22.6	50.0	27.4

* Peak measurements are recorded for informational purposes only.