



EMC EMISSIONS - TEST REPORT (Full)

Test Report No. **BC500354-1** Issue Date: **September 14, 2005**

Model / Serial No. **MN: GP-RWT/ SN: 001**

Product Type **Active RFID Tag**

Client **Active RFID Systems Inc.**

Manufacturer **Active RFID Systems Inc.**

License holder **Active RFID Systems Inc.**

Address **477 Cr 65**

Evergreen, CO 80437

Test Criteria Applied
Test Result

FCC CFR47 Part 15.231

PASS

BC500354

43

Title 47 CFR 15.231: RADIO
FREQUENCY DEVICES operating in the
frequency range of 40.66-40.70MHz and
above 70MHz (including 15.205, 15.207,
15.209 where applicable)

Test Project Number
References
Total Pages
Including
Appendices:

Todd Seeley

Reviewed By : Todd Seeley

Robert Cresswell

Approved By : Bob Cresswell

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Lab Code:200264-0

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STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty for Conducted Emissions in the frequency range of 150kHz – 30MHz is calculated to be $\pm 2.30\text{dB}$ and for Radiated Emissions is calculated to be $\pm 3.60\text{dB}$ in the frequency range of 30MHz – 200MHz and $\pm 3.38\text{dB}$ in the frequency range of 200MHz – 1000MHz.

EUT Received Date: 12 -Sept.-2005

Testing Start Date: 12 -Sept.-2005

Testing End Date: 14 -Oct.-2005

The tests were performed according to following regulations :

1. FCC CFR47 Part 15.205
2. FCC CFR47 Part 15.207
3. FCC CFR47 Part 15.209
4. FCC CFR47 Part 15.231
5. ICES-003

Emission Test Results:

Conducted Emissions, Powerline (15.207) - Not Applicable

Test Result

Minimum limit margin 00.00 dB at 000.00 MHz

Maximum limit exceeding dB at MHz

Remarks: Battery Powered Device

Radiated Emissions 15.209 / 15.231(b)(3) - PASS

Test Result

Minimum limit margin -8.5 dB at 1735.44 MHz

Maximum limit exceeding dB at MHz

Remarks: Emissions testing for 15.209 started at 0.038MHz

Radiated Emissions 15.205\15.231(b)(1)(2) - PASS

Test Result

Minimum limit margin - 20.94 dB at 4338.6 MHz

Maximum limit exceeding dB at MHz

Remarks:

Radiated Emissions 15.231(a)(1)&(2) - PASS

Test Result

Remarks: Required measurement for manually and automatic operated transmitter equipment. <5 Sec. after activation

Radiated Emissions 15.231(c) - PASS

Test Result

Remarks: Devices operated within the frequency band of 70 – 900MHz: -20dBc Bandwidth maximum of 0.25% of the center frequency

Devices operated within the frequency band of >900MHz: -20dBc Bandwidth maximum of 0.50% of the center frequency

Radiated Emissions 15.231(d) - Not Applicable**Test Result**

Remarks: Devices operated within the frequency band of 40.66 – 40.70MHz: **-20dBc Bandwidth** maximum of 0.01% of the center frequency as measured through the temp range of -20 to +50 deg. C, and at 85 - 115% of the nominal supply voltage at 20 deg. C “a new battery would be used in cases where the device is powered from a battery”

Radiated Emissions 15.231(e) - PASS**Test Result**

Minimum limit margin -7.8 dB at 433.86 MHz

Maximum limit exceeding dB at MHz

Remarks: Measurements were taken utilizing the methods dictated by Part 15.35 for averaging pulsed emissions and for limiting peak emissions

GENERAL REMARKS:

The following remarks are to be considered as “where applicable” and are taken into account while completing any FCC/IC/ETSI radio tests at International Approvals Laboratories, LLC.

Testing was performed in 3 different orthogonal axis to determine the worst case emissions from the device. The worst case emissions measurements are shown in this report.

FCC CFR47 Part 15.31: Measurement Standards: In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

FCC CFR47 Part 15.35: Measurement Detector Functions and Bandwidths: FCC Part 15.35 was utilized when performing the measurements within this report.

In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

The actual test distance for the FCC Part 15.209 testing was conducted at 10m for the fact that the device was being tested to EN55022 Class B from 30 MHz to 1000 MHz (meets/exceeds the FCC Part 15.209 & 109B limits).

Modifications required to pass: **NONE**

Test Specification Deviations: **NONE**

Required Information In Accordance to FCC CFR 47 Part 2.1033:

Rule Part 11, 15 & 18 Devices	Other Rule Part Devices	Description	Comments
2.1033(b)(1)	2.1033(c)(1)	Manu. Contact	See Page 1 of this report
2.1033(b)(2)	2.1033(c)(2)	FCC Identifier	
2.1033(b)(3)	2.1033(c)(3)	Users Manual to include Operating, installation	Attached as Exhibit
	2.1033(c)(4)	Emissions Designator per 2.	
	2.1033(c)(5)	Frequency Range	Not Applicable to Part 15 Devcies
	2.1033(c)(6)	Power range and controls	Not Applicable to Part 15 Devcies
	2.1033(c)(7)	Maximum power ouput rating	Not Applicable to Part 15 Devcies
	2.1033(c)(8)	DC Voltage and Current suplying final RF stages	Not Applicable to Part 15 Devcies
2.1033(b)(3)	2.1033(c)(9)	Tune –up procedure	Please refer to the users manual for applicability
2.1033(b)(4&5)	2.1033(c)(10)	Complete Circuit Diagrams and circuit operation description	Attached as Exhibit
2.1033(b)(7)	2.1033(c)(11)	Photographs/drawings of the identification label & its location on the device	Attached as Exhibit
2.1033(b)(7)	2.1033(c)(12)	Photographs of the external and internal surfaces, and construction	Attached as Exhibit
	2.1033(c)(13)	Digital Modulation	Not Applicable
2.1033(b)(6)	2.1033(c)(14)	Report of Measurement Data Required by 2.1046 – 2.1057	See Data Below (This report consists of the testing required under Part 15.231)
2.1033(b)(8)		Description of publicly available support equipment used during test	Refer to Exhibit B of this report (Client Test Plan)
2.1033(b)(9)		Statement of Autorization to Part 15.37 of CFR47	The equipment herein is being authorized in accordance to 15.37 of the CFR47 Rules.
2.1033(b)(10)		Direct Sequence Spread Spectrum Devices (DSSS)	Exhibit of compliance to 15.247(e)
2.1033(b)(10)		Frequency Hopping Devices	Exhibit of compliance to 15.247(a)(1)
2.1033(b)(11)		Scanning receiver construction	Exhibit stating compliance to construction in accordance to 15.121.
15.31	15.31	Transmitter Supply Voltage	Testing herein was completed in accordance to FCC CFR47 Part 15.31

Exhibits Including (where applicable):

- | | |
|------------------------------------|---|
| 1. Users Manual | 7. Parts List |
| 2. Operation Description | 8. Tuning Procedure (if applicable) |
| 3. Block Diagram | 9. Test Setup Photograph |
| 4. Report of Measurement | 10. Label Drawings and or Photograpghs |
| 5. External & Internal Photographs | 11. Description of Support Equipment (where Applicable) |
| 6. Schematic | |

Required Information in Accordance to Industry Canada Regulations (In addition to the above):

Information Required	Description	Comments
Modulation Type	(i.e. ASK, NON, FSK, DSSS, FHSS, etc.)	
Emissions Designator	Per TRC-49	
In Country Representative	Contact Information	
99% Bandwidth Measurement	Per RSS-210	

Test-setup photo(s):
Conducted Emissions

N/A

Test-setup photo(s):
Radiated Emissions Intentional and Unintentional



Test-setup photo(s):
Radiated Emissions Intentional and Unintentional



Appendix A

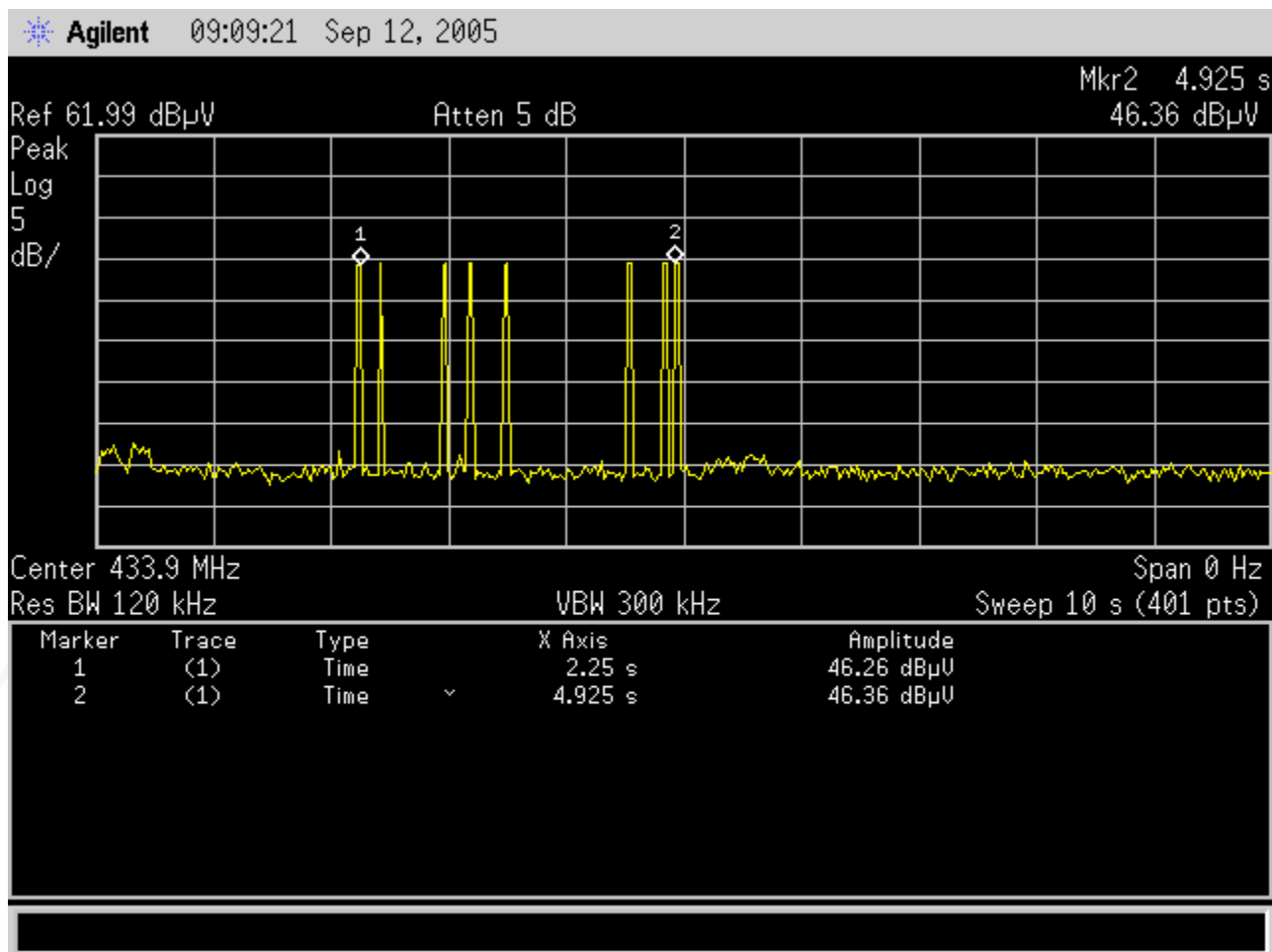
Test Data Sheets and Test Equipment Used

Part 15.231 (a) (1&2)

Device must cease to function after manual or automatic activation.

Verification of 5 second Deactivation

Activation occurred at Marker 1
Deactivation occurred at Marker 2



Part 15.231 (b)(1)(2) and (e)
Field Strength Emissions from Intentional Radiators

&

Part 15.231 (b)(3) / 15.205
Spurious emissions
Restricted Bands of Operation

Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #: BC500354 Run 01	Test Area: Pinewood Site 1 (3m)	Temperature: 20.0 °C
Test Method: N/A	Test Date: 14-Oct-2005	Relative Humidity: 80 %
EUT Model #: GP-RWT	EUT Power: 3.5 VDC	Air Pressure: 81 kPa
EUT Serial #: 0001		14 of 2
Manufacturer: Active RFID Systems Inc.		
EUT Description: Active RFID tag		
Notes:		

Level Key	
Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m) 15.231(b)	(dB)

The following duty cycle was declared by the manufacturer.

Duty Cycle = active / 100ms. = 25.0%

Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.231 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.231 and the emission/limit delta was calculated.

The DTCF is calculated as follows $20 \cdot \log_{10}(\text{duty cycle in 100ms})$ "not to exceed 20dB"

Part **15.231(b)** / **15.205**

All of the following were maximized.

EUT is sitting with side B down antenna on top.

433.86	59.4 Pk	2.4 / 15.4 / 0.0	77.1	V / 1.3 / 66.0	-12.04	65.06	80.82	-15.76
433.86	48.7 Pk	2.4 / 15.4 / 0.0	66.4	H / 4.0 / 0.0	-12.04	54.36	80.82	-26.46

EUT is sitting with side C down antenna at 90 degrees

433.86	57.2 Pk	2.4 / 15.4 / 0.0	74.9	H / 1.9 / 15.0	-12.04	62.86	80.82	-17.96
433.86	47.9 Pk	2.4 / 15.4 / 0.0	65.6	V / 1.1 / 122.0	-12.04	53.56	80.82	-27.26

EUT is sitting with side A down antenna at 90 degrees

433.86	53.5 Pk	2.4 / 15.4 / 0.0	71.2	V / 1.3 / 315.0	-12.04	59.16	80.82	-21.66
433.86	57.3 Pk	2.4 / 15.4 / 0.0	75	H / 1.9 / 345.0	-12.04	62.96	80.82	-17.86

The EUT was placed in its worst case position.

867.72	25.3 Pk	3.5 / 22.0 / 0.0	50.7	H / 3.2 / 345.0	-12.04	38.66	60.82	-22.16
867.72	29.7 Pk	3.5 / 22.0 / 0.0	55.1	V / 1.4 / 65.0	-12.04	43.06	60.82	-17.76
1301.58	52.5 Pk	2.6 / 23.0 / 37.7	40.5	V / 1.0 / 130.0	-12.04	28.46	54.00	-25.54
1301.58	51.5 Pk	2.6 / 23.0 / 37.7	39.4	H / 1.0 / 195.0	-12.04	27.36	54.00	-26.64
1735.44	66.4 Pk	3.0 / 24.7 / 37.8	56.4	V / 1.0 / 283.0	-12.04	44.36	60.82	-16.46
1735.44	58.0 Pk	3.0 / 24.7 / 37.8	48	H / 1.0 / 55.0	-12.04	35.96	60.82	-24.86
2169.3	53.9 Pk	3.5 / 26.0 / 38.2	45.2	H / 1.1 / 157.0	-12.04	33.16	60.82	-27.66
2169.3	62.4 Pk	3.5 / 26.0 / 38.2	53.7	V / 1.0 / 256.0	-12.04	41.66	60.82	-19.16

Field Strength Measurements

Fundamental and Spurious of the Transmitter

Test Report #: BC500354 Run 01	Test Area: Pinewood Site 1 (3m)	Temperature: 20.0 °C
Test Method: N/A	Test Date: 14-Oct-2005	Relative Humidity: 80 %
EUT Model #: GP-RWT	EUT Power: 3.5 VDC	Air Pressure: 81 kPa
EUT Serial #: 0001		15 of 2
Manufacturer: Active RFID Systems Inc.		
EUT Description: Active RFID tag		
Notes:		

Level Key	
Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m) 15.231(b)	(dB)

The following duty cycle was declared by the manufacturer.

Duty Cycle = active / 100ms. = 25.0%

Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.231 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.231 and the emission/limit delta was calculated.

The DTCF is calculated as follows $20 \cdot \log_{10}(\text{duty cycle in 100ms})$ "not to exceed 20dB"

Part **15.231(b)** / **15.205**

2603.16	50.4 Pk	4.1 / 26.6 / 38.4	42.7	H / 1.4 / 188.0	-12.04	30.66	60.82	-30.16
2603.16	48.5 Pk	4.1 / 26.6 / 38.4	40.8	V / 1.0 / 340.0	-12.04	28.76	60.82	-32.06
3037.02	49.9 Pk	4.6 / 27.7 / 38.3	44	V / 1.0 / 225.0	-12.04	31.96	60.82	-28.86
3037.02	46.8 Pk	4.6 / 27.7 / 38.3	40.9	H / 1.0 / 0.0	-12.04	28.86	60.82	-31.96
3470.88	48.5 Pk	4.8 / 28.6 / 37.6	44.2	V / 1.0 / 236.0	-12.04	32.16	60.82	-28.66
3470.88	49.8 Pk	4.8 / 28.6 / 37.6	45.6	H / 1.8 / 165.0	-12.04	33.56	60.82	-27.26
3904.74	45.5 Pk	5.5 / 29.5 / 37.7	42.8	H / 1.0 / 0.0	-12.04	30.76	54.00	-23.24
3904.74	45.4 Pk	5.5 / 29.5 / 37.7	42.8	V / 1.0 / 0.0	-12.04	30.76	54.00	-23.24
4338.6	49.1 Pk	6.3 / 30.0 / 40.3	45.1	V / 1.0 / 347.0	-12.04	33.06	54.00	-20.94
4338.6	46.1 Pk	6.3 / 30.0 / 40.3	42.1	H / 2.0 / 8.0	-12.04	30.06	54.00	-23.94

Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #: BC500354 Run 01	Test Area: Pinewood Site 1 (3m)	Temperature: 20.0 °C
Test Method: N/A	Test Date: 14-Oct-2005	Relative Humidity: 80 %
EUT Model #: GP-RWT	EUT Power: 3.5 VDC	Air Pressure: 81 kPa
EUT Serial #: 0001		16 of 2
Manufacturer: Active RFID Systems Inc.		
EUT Description: Active RFID tag		
Notes:		

Level Key

Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m) 15.231(e)	(dB)

The following duty cycle was declared by the manufacturer.

Duty Cycle = active / 100ms. = 25.0%

Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.231 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.231 and the emission/limit delta was calculated. The DTCF is calculated as follows $20 \cdot \log_{10}(\text{duty cycle in 100ms})$ "not to exceed 20dB"

Part 15.231(e)

All of the following were maximized.

EUT is sitting with side B down antenna on top.

433.86	59.4 Pk	2.4 / 15.4 / 0.0	77.1	V / 1.3 / 66.0	-12.04	65.06	72.86	-7.80
433.86	48.7 Pk	2.4 / 15.4 / 0.0	66.4	H / 4.0 / 0.0	-12.04	54.36	72.86	-18.50

EUT is sitting with side C down antenna at 90 degrees

433.86	57.2 Pk	2.4 / 15.4 / 0.0	74.9	H / 1.9 / 15.0	-12.04	62.86	72.86	-10.00
433.86	47.9 Pk	2.4 / 15.4 / 0.0	65.6	V / 1.1 / 122.0	-12.04	53.56	72.86	-19.30

EUT is sitting with side A down antenna at 90 degrees

433.86	53.5 Pk	2.4 / 15.4 / 0.0	71.2	V / 1.3 / 315.0	-12.04	59.16	72.86	-13.70
433.86	57.3 Pk	2.4 / 15.4 / 0.0	75	H / 1.9 / 345.0	-12.04	62.96	72.86	-9.90

The EUT was placed in its worst case position.

867.72	25.3 Pk	3.5 / 22.0 / 0.0	50.7	H / 3.2 / 345.0	-12.04	38.66	52.86	-14.20
867.72	29.7 Pk	3.5 / 22.0 / 0.0	55.1	V / 1.4 / 65.0	-12.04	43.06	52.86	-9.80
1301.58	52.5 Pk	2.6 / 23.0 / 37.7	40.5	V / 1.0 / 130.0	-12.04	28.46	52.86	-24.40
1301.58	51.5 Pk	2.6 / 23.0 / 37.7	39.4	H / 1.0 / 195.0	-12.04	27.36	52.86	-25.50
1735.44	66.4 Pk	3.0 / 24.7 / 37.8	56.4	V / 1.0 / 283.0	-12.04	44.36	52.86	-8.50
1735.44	58.0 Pk	3.0 / 24.7 / 37.8	48	H / 1.0 / 55.0	-12.04	35.96	52.86	-16.90
2169.3	53.9 Pk	3.5 / 26.0 / 38.2	45.2	H / 1.1 / 157.0	-12.04	33.16	52.86	-19.70
2169.3	62.4 Pk	3.5 / 26.0 / 38.2	53.7	V / 1.0 / 256.0	-12.04	41.66	52.86	-11.20

Field Strength Measurements

Fundamental and Spurious of the Transmitter

Test Report #: BC500354 Run 01	Test Area: Pinewood Site 1 (3m)	Temperature: 20.0 °C
Test Method: N/A	Test Date: 14-Oct-2005	Relative Humidity: 80 %
EUT Model #: GP-RWT	EUT Power: 3.5 VDC	Air Pressure: 81 kPa
EUT Serial #: 0001		17 of 2
Manufacturer: Active RFID Systems Inc.		
EUT Description: Active RFID tag		
Notes:		

Level Key	
Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m) 15.231(e)	(dB)

The following duty cycle was declared by the manufacturer.

Duty Cycle = active / 100ms. = 25.0%

Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.231 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.231 and the emission/limit delta was calculated.

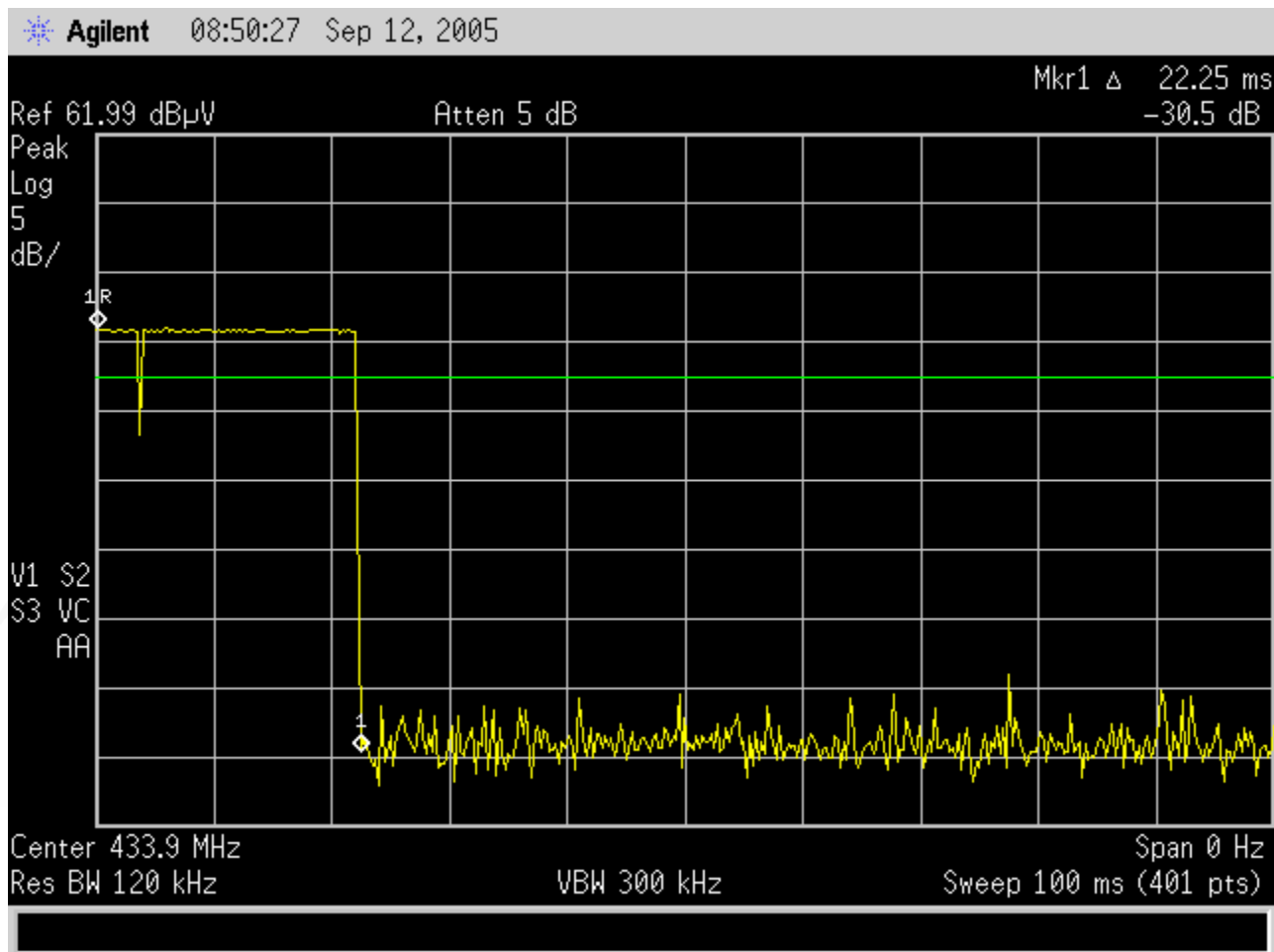
The DTCF is calculated as follows $20 \cdot \log_{10}(\text{duty cycle in 100ms})$ "not to exceed 20dB"

Part 15.231(e)

2603.16	50.4 Pk	4.1 / 26.6 / 38.4	42.7	H / 1.4 / 188.0	-12.04	30.66	52.86	-22.20
2603.16	48.5 Pk	4.1 / 26.6 / 38.4	40.8	V / 1.0 / 340.0	-12.04	28.76	52.86	-24.10
3037.02	49.9 Pk	4.6 / 27.7 / 38.3	44	V / 1.0 / 225.0	-12.04	31.96	52.86	-20.90
3037.02	46.8 Pk	4.6 / 27.7 / 38.3	40.9	H / 1.0 / 0.0	-12.04	28.86	52.86	-24.00
3470.88	48.5 Pk	4.8 / 28.6 / 37.6	44.2	V / 1.0 / 236.0	-12.04	32.16	52.86	-20.70
3470.88	49.8 Pk	4.8 / 28.6 / 37.6	45.6	H / 1.8 / 165.0	-12.04	33.56	52.86	-19.30
3904.74	45.5 Pk	5.5 / 29.5 / 37.7	42.8	H / 1.0 / 0.0	-12.04	30.76	52.86	-22.10
3904.74	45.4 Pk	5.5 / 29.5 / 37.7	42.8	V / 1.0 / 0.0	-12.04	30.76	52.86	-22.10
4338.6	49.1 Pk	6.3 / 30.0 / 40.3	45.1	V / 1.0 / 347.0	-12.04	33.06	52.86	-19.80
4338.6	46.1 Pk	6.3 / 30.0 / 40.3	42.1	H / 2.0 / 8.0	-12.04	30.06	52.86	-22.80

Duty Cycle Correction Factor Justification

The following plot was taken to verify the actual Duty Cycle as specified in the FCC CFR47 Rules and was utilized to perform the DCCF adjustment for averaging emissions allowed in FCC CFR47 Part 15.35.



Part 15.231 (b)(3) / 15.209
Spurious and Unintentional Emissions

Radiated Electromagnetic Emissions



Test Report #:	BC500354 Run 04	Test Area:	Pinewood Site 1 (10m)
Test Method:	EN55022	Test Date:	13-Sep-2005
EUT Model #:	GP-RWT/	EUT Power:	3.5 VDC/3.0VDC
EUT Serial #:	0001		
Manufacturer:	Active RFID Inc.		
EUT Description:	Active RFID tag and IR handheld trigger		
Notes:			

Temperature: _____ °C
 Relative Humidity: _____ %
 Air Pressure: _____ kPa
 Page: 20 of 4

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) EN55022 B	DELTA2 (dB) N/A
72.01	35.7 Qp	2.3 / 8.0 / 28.1	17.9	V / 1.0 / 0.0	-12.1	N/A
156.12	28.9 Qp	3.2 / 12.0 / 27.7	16.5	V / 1.0 / 0.0	-13.5	N/A
184.87	32.1 Qp	3.7 / 12.5 / 27.5	20.7	V / 1.0 / 0.0	-9.3	N/A
No higher emissions found 90Deg, Vertical.						
No higher emissions found 180Deg, Vertical.						
No higher emissions found 270Deg, Vertical.						
The following were maximized between 30 and 200 MHz.						
72.01MHz did not maximize any higher.						
156.34	29.1 Qp	3.2 / 12.0 / 27.7	16.6	V / 1.0 / 12.0	-13.4	N/A
184.87MHz did not maximize any higher.						
No higher emissions found 0Deg, Horizontal.						
No higher emissions found 90Deg, Horizontal.						
No higher emissions found 180Deg, Horizontal.						
No higher emissions found 270Deg, Horizontal.						
Noise floor.						
30.00	23.0 Qp	1.5 / 12.9 / 28.2	9.2	H / 2.5 / 270.0	-20.8	N/A
80.00	30.9 Qp	2.4 / 6.9 / 28.1	12.2	H / 2.5 / 270.0	-17.8	N/A
190.00	26.9 Qp	3.7 / 12.8 / 27.5	15.9	H / 2.5 / 270.0	-14.1	N/A
221.16	33.6 Qp	4.0 / 10.4 / 27.3	20.7	V / 1.0 / 0.0	-9.3	N/A
224.83	35.0 Qp	4.0 / 10.2 / 27.2	21.9	V / 1.0 / 0.0	-8.1	N/A
239.82	31.1 Qp	4.1 / 10.6 / 27.1	18.8	V / 1.0 / 0.0	-18.2	N/A

Radiated Electromagnetic Emissions

Test Report #:	BC500354 Run 04	Test Area:	Pinewood Site 1 (10m)
Test Method:	EN55022	Test Date:	13-Sep-2005
EUT Model #:	GP-RWT/	EUT Power:	3.5 VDC/3.0VDC
EUT Serial #:	0001		
Manufacturer:	Active RFID Inc.		
EUT Description:	Active RFID tag and IR handheld trigger		
Notes:			

Temperature:	_____ °C
Relative Humidity:	_____ %
Air Pressure:	_____ kPa
Page:	2 of 4

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) EN55022 B	DELTA2 (dB) N/A
245.75	29.4 Qp	4.2 / 11.0 / 27.1	17.5	V / 1.0 / 0.0	-19.5	N/A
250.56	34.2 Qp	4.2 / 11.3 / 27.1	22.5	V / 1.0 / 0.0	-14.5	N/A
334.08	35.0 Qp	4.9 / 13.8 / 27.2	26.5	V / 1.0 / 0.0	-10.5	N/A
221.16	34.3 Qp	4.0 / 10.4 / 27.3	21.4	V / 1.0 / 90.0	-8.6	N/A
214.84	36.2 Qp	4.0 / 10.3 / 27.3	23.2	V / 1.0 / 90.0	-6.8	N/A
No higher emissions found 180Deg, Horizontal.						
207.98	28.7 Qp	3.9 / 10.4 / 27.4	15.7	V / 1.0 / 270.0	-14.3	N/A
215.98	27.7 Qp	4.0 / 10.3 / 27.3	14.7	V / 1.0 / 270.0	-15.3	N/A
240.03	28.3 Qp	4.1 / 10.7 / 27.1	15.9	V / 1.0 / 270.0	-21.1	N/A
288.01	23.9 Qp	4.5 / 12.8 / 27.0	14.2	V / 1.0 / 270.0	-22.8	N/A
The following were maximized between 200 and 1000 MHz.						
214.84	36.5 Qp	4.0 / 10.3 / 27.3	23.4	V / 1.0 / 72.0	-6.6	N/A
221.17	35.4 Qp	4.0 / 10.4 / 27.3	22.5	V / 1.0 / 55.0	-7.5	N/A
224.83	37.3 Qp	4.0 / 10.2 / 27.2	24.3	V / 1.0 / 31.0	-5.7	N/A
No higher emissions found 0Deg, Horizontal.						
250.56	33.3 Qp	4.2 / 11.3 / 27.1	21.7	H / 2.5 / 90.0	-15.3	N/A
334.08	34.2 Qp	4.9 / 13.8 / 27.2	25.7	H / 2.5 / 90.0	-11.3	N/A
No higher emissions found 180Deg, Horizontal.						
214.84	31.8 Qp	4.0 / 10.3 / 27.3	18.7	H / 2.5 / 270.0	-11.3	N/A
221.17	35.1 Qp	4.0 / 10.4 / 27.3	22.3	H / 2.5 / 270.0	-7.7	N/A
224.83	32.9 Qp	4.0 / 10.2 / 27.2	19.9	H / 2.5 / 270.0	-10.1	N/A
240.03	28.8 Qp	4.1 / 10.7 / 27.1	16.5	H / 2.5 / 270.0	-20.5	N/A
250.56	33.2 Qp	4.2 / 11.3 / 27.1	21.6	H / 2.5 / 270.0	-15.4	N/A

Radiated Electromagnetic Emissions

Test Report #:	BC500354 Run 04	Test Area:	Pinewood Site 1 (10m)
Test Method:	EN55022	Test Date:	13-Sep-2005
EUT Model #:	GP-RWT/	EUT Power:	3.5 VDC/3.0VDC
EUT Serial #:	0001		
Manufacturer:	Active RFID Inc.		
EUT Description:	Active RFID tag and IR handheld trigger		
Notes:			

Temperature:	_____ °C
Relative Humidity:	_____ %
Air Pressure:	_____ kPa
Page:	3 of 4

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) EN55022 B	DELTA2 (dB) N/A
288.01	24.2 Qp	4.5 / 12.8 / 27.0	14.5	H / 2.5 / 270.0	-22.5	N/A
334.08	34.6 Qp	4.9 / 13.8 / 27.2	26.1	H / 2.5 / 270.0	-10.9	N/A
The following were maximized between 200 and 1000 MHz.						
334.08	35.1 Qp	4.9 / 13.8 / 27.2	26.6	H / 2.4 / 270.0	-10.4	N/A
224.83	33.8 Qp	4.0 / 10.2 / 27.2	20.7	H / 3.0 / 268.0	-9.3	N/A
221.17	36.3 Qp	4.0 / 10.4 / 27.3	23.4	H / 2.9 / 268.0	-6.6	N/A
The following are noise floor points.						
500.00	23.7 Qp	6.1 / 17.0 / 28.4	18.5	H / 2.5 / 270.0	-18.5	N/A
995.00	20.0 Qp	9.3 / 23.2 / 27.3	25.2	H / 2.5 / 270.0	-11.8	N/A

Radiated Electromagnetic Emissions



Test Report #:	BC500354 Run 04	Test Area:	Pinewood Site 1 (10m)
Test Method:	EN55022	Test Date:	13-Sep-2005
EUT Model #:	GP-RWT/	EUT Power:	3.5 VDC/3.0VDC
EUT Serial #:	0001		
Manufacturer:	Active RFID Inc.		
EUT Description:	Active RFID tag and IR handheld trigger		
Notes:			

Temperature: _____ °C
 Relative Humidity: _____ %
 Air Pressure: _____ kPa
 Page: 4 of 4

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV/m)	(m) (DEG)	EN55022 B	N/A
***** Measurement Summary *****						
224.83	37.3 Qp	4.0 / 10.2 / 27.2	24.3	V / 1.0 / 31.0	-5.7	N/A
214.84	36.5 Qp	4.0 / 10.3 / 27.3	23.4	V / 1.0 / 72.0	-6.6	N/A
221.17	36.3 Qp	4.0 / 10.4 / 27.3	23.4	H / 2.9 / 268.0	-6.6	N/A
184.87	32.1 Qp	3.7 / 12.5 / 27.5	20.7	V / 1.0 / 0.0	-9.3	N/A
30.00	33.6 Qp	1.5 / 12.9 / 28.2	19.8	H / 2.5 / 270.0	-10.2	N/A
334.08	35.1 Qp	4.9 / 13.8 / 27.2	26.6	H / 2.4 / 270.0	-10.4	N/A
995.00	20.0 Qp	9.3 / 23.2 / 27.3	25.2	H / 2.5 / 270.0	-11.8	N/A
72.01	35.7 Qp	2.3 / 8.0 / 28.1	17.9	V / 1.0 / 0.0	-12.1	N/A
156.34	29.1 Qp	3.2 / 12.0 / 27.7	16.6	V / 1.0 / 12.0	-13.4	N/A
156.12	28.9 Qp	3.2 / 12.0 / 27.7	16.5	V / 1.0 / 0.0	-13.5	N/A
190.00	26.9 Qp	3.7 / 12.8 / 27.5	15.9	H / 2.5 / 270.0	-14.1	N/A
207.98	28.7 Qp	3.9 / 10.4 / 27.4	15.7	V / 1.0 / 270.0	-14.3	N/A
250.56	34.2 Qp	4.2 / 11.3 / 27.1	22.5	V / 1.0 / 0.0	-14.5	N/A
215.98	27.7 Qp	4.0 / 10.3 / 27.3	14.7	V / 1.0 / 270.0	-15.3	N/A
80.00	30.9 Qp	2.4 / 6.9 / 28.1	12.2	H / 2.5 / 270.0	-17.8	N/A
239.82	31.1 Qp	4.1 / 10.6 / 27.1	18.8	V / 1.0 / 0.0	-18.2	N/A
500.00	23.7 Qp	6.1 / 17.0 / 28.4	18.5	H / 2.5 / 270.0	-18.5	N/A
245.75	29.4 Qp	4.2 / 11.0 / 27.1	17.5	V / 1.0 / 0.0	-19.5	N/A
240.03	28.8 Qp	4.1 / 10.7 / 27.1	16.5	H / 2.5 / 270.0	-20.5	N/A
288.01	24.2 Qp	4.5 / 12.8 / 27.0	14.5	H / 2.5 / 270.0	-22.5	N/A

Radiated Electromagnetic Emissions



Test Report #:	BC500354 Run 05	Test Area:	Pinewood Site 1 (3m)
Test Method:	FCC Part 15.209	Test Date:	13-Sep-2005
EUT Model #:	GP-RWT/	EUT Power:	3.5 VDC/3.0VDC
EUT Serial #:	0001		
Manufacturer:	Active RFID Inc.		
EUT Description:	Active RFID tag and IR handheld trigger		
Notes:			

Temperature: 23.4 °C
 Relative Humidity: 36 %
 Air Pressure: 80.0 kPa
 Page: 24 of 2

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
The loop antenna is perpendicular.						
No emissions were found from .038 to 30 MHz.						
The following are noise floor points.						
0.0380	34.9 Qp	0.0 / 12.1 / 0.0	47.1	V / 1.0 / 0.0	-68.9	N/A
10.00	17.6 Qp	0.2 / 10.5 / 0.0	28.3	V / 1.0 / 0.0	-41.2	N/A
20.00	8.3 Qp	0.4 / 10.3 / 0.0	19.0	V / 1.0 / 0.0	-50.5	N/A
The loop antenna is parallel						
No emissions were found from .038 to 30 MHz.						
The following are noise floor points.						
0.100	30.1 Qp	0.1 / 11.0 / 0.0	41.2	H / 1.0 / 0.0	-66.4	N/A
15.00	9.2 Qp	0.3 / 10.7 / 0.0	20.2	H / 1.0 / 0.0	-49.3	N/A
29.00	6.9 Qp	0.5 / 8.7 / 0.0	16.1	H / 1.0 / 0.0	-53.4	N/A
No emissions found between 1 and 4 GHz Vertical.						
1000.00	32.0 Av	3.7 / 22.0 / 37.6	20.1	V / 1.0 / 0.0	N/A	-33.9
3000.00	34.3 Av	4.6 / 27.7 / 38.1	28.5	V / 1.0 / 0.0	N/A	-25.5
4000.00	33.2 Av	5.7 / 29.7 / 37.7	31.0	V / 1.0 / 0.0	N/A	-23.0
No emissions found between 1 and 4 GHz Horizontal.						
1500.00	33.9 Av	2.9 / 23.7 / 37.3	23.1	V / 1.0 / 0.0	N/A	-30.9
3500.00	34.5 Av	4.8 / 28.6 / 37.7	30.2	V / 1.0 / 0.0	N/A	-23.8
No emissions found between 4 and 4.5 GHz Horizontal.						
Noise floor.						
4500.00	32.6 Av	6.6 / 30.1 / 40.5	28.8	V / 1.0 / 0.0	N/A	-25.2
No emissions found between 4 and 4.5 GHz Vertical.						
Noise floor.						
4400.00	32.9 Av	6.4 / 30.0 / 40.3	29.1	V / 1.0 / 0.0	N/A	-24.9

Radiated Electromagnetic Emissions



Test Report #: **BC500354 Run 05**
 Test Method: **FCC Part 15.209**
 EUT Model #: **GP-RWT/**
 EUT Serial #: **0001**
 Manufacturer: **Active RFID Inc.**
 EUT Description: **Active RFID tag and IR handheld trigger**
 Notes:

Test Area: **Pinewood Site 1 (3m)**
 Test Date: **13-Sep-2005**
 EUT Power: **3.5 VDC/3.0VDC**

Temperature: **23.4** °C
 Relative Humidity: **36** %
 Air Pressure: **80.0** kPa
 Page: **2** of **2**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
***** Measurement Summary *****						
4000.00	33.2 Av	5.7 / 29.7 / 37.7	31.0	V / 1.0 / 0.0	N/A	-23.0
3500.00	34.5 Av	4.8 / 28.6 / 37.7	30.2	V / 1.0 / 0.0	N/A	-23.8
4400.00	32.9 Av	6.4 / 30.0 / 40.3	29.1	V / 1.0 / 0.0	N/A	-24.9
4500.00	32.6 Av	6.6 / 30.1 / 40.5	28.8	V / 1.0 / 0.0	N/A	-25.2
3000.00	34.3 Av	4.6 / 27.7 / 38.1	28.5	V / 1.0 / 0.0	N/A	-25.5
1500.00	33.9 Av	2.9 / 23.7 / 37.3	23.1	V / 1.0 / 0.0	N/A	-30.9
1000.00	32.0 Av	3.7 / 22.0 / 37.6	20.1	V / 1.0 / 0.0	N/A	-33.9
10.00	17.6 Qp	0.2 / 10.5 / 0.0	28.3	V / 1.0 / 0.0	-41.2	N/A
15.00	9.2 Qp	0.3 / 10.7 / 0.0	20.2	H / 1.0 / 0.0	-49.3	N/A
20.00	8.3 Qp	0.4 / 10.3 / 0.0	19.0	V / 1.0 / 0.0	-50.5	N/A
29.00	6.9 Qp	0.5 / 8.7 / 0.0	16.1	H / 1.0 / 0.0	-53.4	N/A
0.100	30.1 Qp	0.1 / 11.0 / 0.0	41.2	H / 1.0 / 0.0	-66.4	N/A
0.0380	34.9 Qp	0.0 / 12.1 / 0.0	47.1	V / 1.0 / 0.0	-68.9	N/A

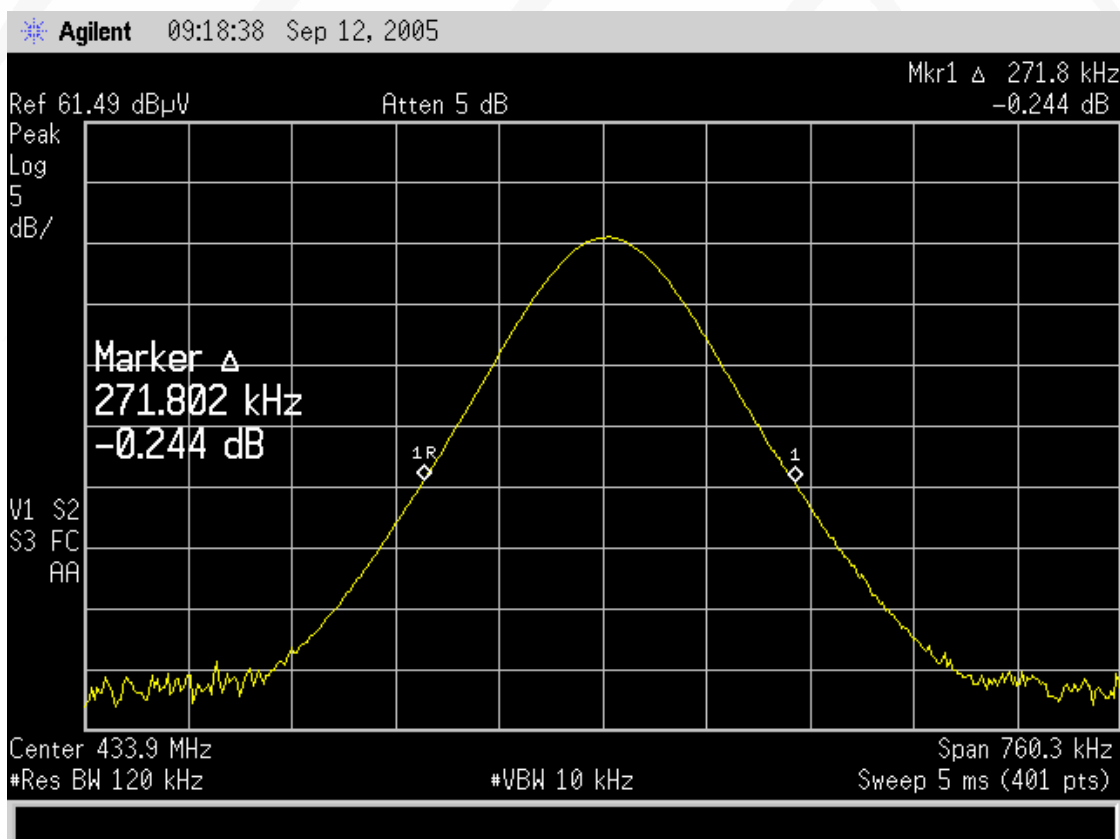
Part 15.231 (c) and/or (d)
Stability over Temperature and Voltage
-20dBc Bandwidth

-20dB Bandwidth Measurement

Test Report #:	BC500354 Run 1	Test Area:	Pinewood Site 1 (3m)	Temperature:	20.0 °C
Test Method:	N/A	Test Date:	09-Sep-2005	Relative Humidity:	50 %
EUT Model #:	GP-RWT	EUT Power:	3.5 VDC	Air Pressure:	81 kPa
EUT Serial #:	0001	27 of 1			
Manufacturer:	Active RFID Inc.				
EUT Description:	Active RFID tag				
Notes:	Measurements were taken in accordance to FCC CFR47 Part 15.231(c).				

-20dBc Bandwidth Section (c)

Resolution Bandwidth Utilized	Bandwidth Measured -20dBc	Bandwidth Limit 0.25% or 0.50% of The Fundamental Carrier Freq.	DELTA from Bandwidth Limit to Fundamental Carrier Freq.
(kHz)	(HZ)	(Hz)	(Hz)
120	271,800	1,084,650	812,850





Equipment Utilized During Test

Project Report

Begin Date: 9/12/2005 **End Date:** 10/14/2005

Technician Mike Spataro

Project BC500354

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
6	Hewlett-Packard	8594E	3223A00145	Spectrum Analyzer	R Radiated Emissions	For Cal	1/6/2005	1/6/2006
135	EMCO	3146	9402-3775	Log Periodic Antenna (200-1000MHz)	R Radiated Emissions	For Cal	9/30/2005	9/30/2006
138	EMC TEST SYSTEMS	3109	3142	Biconical Antenna 30-300MHz	R Radiated Emissions	For Cal	9/30/2005	9/30/2006
187	EMCO	3115	9205-3886	Horn Antenna 1-18GHz	R Radiated Emissions	For Cal	1/18/2005	1/18/2006
195	EMCO	6502	9205-2738	Magnetic loop	R Radiated Emissions	For Cal	7/13/2005	7/13/2006
203	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	For Ver	4/4/2005	4/4/2006
213	Mini-Circuits Lab	ZHL-42	N052792-2	Amplifier	R Radiated Emissions	For Ver	5/6/2005	5/6/2006
248	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	For Ver	5/6/2005	5/6/2006
259	Hewlett-Packard	E7405A	My44211889	Spectrum Analyzer	R Radiated Emissions	For Cal	10/11/2004	11/11/2005

Appendix B

Test Plan and Constructional Data Form

Request for Estimate & Test Plan

Laboratory/Agent Information:

Agent/Test Lab:	International Approvals Laboratories, LLC
Contact:	Todd Seeley
Title:	Principal Engineer (Services Development Focus)
Phone Number:	(303) 402-5272
Cell Number:	(303) 503-2491
Fax Number:	(303) 449-6160
Email Address:	todd@ialabs.com

Client Information:

License Holder:	Active RFID Systems Inc. (ARS Inc.)
Address:	477 Cr 65, Evergreen, Colorado. 80437
Contact:	Joe Desimone
Title:	CTO, Chief Hardware Design Engineer
Phone Number:	(303) 459-0859
Fax Number:	
Email Address:	jdesimone.ars-inc@direcway.com

Please provide all pertinent information below and email this Form to Todd and Amy at todd@ialabs.com and Amy@ialabs.com for a quotation:

Estimates Requested:

EMC Testing	
☒ Requesting Estimate	☐ No Estimate Required
☐ Pre-Compliance Scans	☐ Engineering Test

Radio Device Testing and Certification	
☐ Requesting Estimate	☐ No Estimate Required
☒ FCC Certification	☒ Industry Canada Certification (Receivers required)
☒ Class 2 Notification Under the R&TTED	

Safety Testing and Certification	
☐ Requesting Estimate	☒ No Estimate Required
☐ NRTL Listing	☐ 1 Day Pre-Assessment (conducted at your facility)
☐ Letter of Findings	☐ CB Report Covering all country Deviations
☐ CE Report to Cover the LVD	☐ CB Report Covering - Specify Countries:
Please list all applicable standards that you would like your device certified under:	

General Product Information:

Product/Model Number(s):	GP-RWT			
Description of product(s):	Infrared -RF ID Tag			
Intended Use:	☐ Household ☒ Commercial ☒ Industrial ☐ Hospital ☐ Life Supporting			
Intended Location:	☒ Dry ☒ Damp ☒ Wet ☐ Hazardous Location			
Product Type:	☐ Prototype ☒ Production Sample ☐ Manufacturing Design Change: Please Describe			
If there is more than one product what are the differences?				
Is the Product Enclosure:	☐ Metal ☒ Plastic ☐ Both			
Size:	Length:	Width:	Height:	Weight:
What Voltages/Current does the EUT run at?	Rated Voltage:3.5 Rated Current:6 mA # of Phases/Conductors:n/a/ # of Power Cords:n/a			
Are their multiple suppliers of power supplies?	☐ Yes ☒ No If Yes Please Describe:			
Are there Multiple Modes of Operation?	☒ Yes ☐ No If Yes Please Describe:			
Can all modes of operation be operated simultaneously?	☐ Yes ☒ No Explain:			
In which countries will you be selling the product?	USA, Europe			

EMC Information:

What EMC certifications are desired?	☒ FCC/ICES (US & Canada) ☒ CE / EMC / MMD ☐ BSMI (Taiwan) ☐ VCCI (Japan) ☐ SII (Israel) ☐ AS/NZS (Australia/New Zealand) ☐ Other: Please Specify
Highest frequency utilized for device operation:	433.92 MHz +/- 200 KHz
List of Clock Frequencies:	4 MHz (internal microprocessor clock, no external crystal)
What is the time that it takes for the device to complete a full cycle of operation? (time required to identify any degradation in performance)	1 Second beacon mode for testing.
Total Number of I/O Cables: # Greater than 3m (9.75 feet) in Length # Greater than 30m (97.5 feet) in Length # of cables at a longer length (specify)	n/a
Number of Dedicated Earth Equalization Ports	n/a
Number of Ethernet and/or Telecommunications Ports	n/a
When the device is a compilation of subsystems (in separate chassis) how many interconnecting I/O's are greater than 1 meter in length between the Subsystem chassis?	n/a
For medical devices: Are there any coupled or direct patient contact points on the device?	☐ Yes ☒ No Describe:

Radio Information:

What Radio certifications are desired?	☒ FCC (USA) ☒ Industry Canada ☒ ETSI (R&TTE) ☐ Other: Please Specify
Operating Frequency:	433.92 MHz +/- 200 kHz
RF Output Power:	Part 231 Section A&E
Is there an RF Conducted Port?	☐ Yes ☒ No Description:
Number of Antennas & Description: (Internal, External, Known Gain, etc.)	1 Internal PCB, not user accessible
Modulation Technique:	ASK, <10 kbps
Number of Channels/Number of Discrete frequencies per Channel:	1/
Can the device be operated in CW Mode?	☐ Yes ☒ No
What is the lowest utilized frequency within the device?	38 kHz

Notes: Please ensure to bring a notch filter covering your fundamental operating frequency.

Safety Information:

Has the device been tested and certified for product safety before? A. If it has been previously tested, to which standard and by which organization? B. Can you provide the test report?	☐ Yes ☒ No Standard tested to: Organization tested by: ☐ Yes ☐ No			
Is the power supply	☐ An approved off the shelf power supply OR ☐ A Custom Model that will need evaluation/ certification			
Does the device contain batteries?	☒ Yes ☐ No What Type? Lithium How Many? 1			
What technology is used? (i.e., lasers, X Ray, etc.)				
If Laser:	Class:	Output Power:	Beam Divergence Angle:	Wavelength:
Is the product a Medical Device?		☐ Yes ☒ No		
Is it an In Vitro Diagnostic Device?		☐ Yes ☒ No		
Testing location: (to be filled in by IALabs)				

Additional Information:

This information is required to be filled in to act as a test plan and constructional data form required to be supplied as part of the test report in accordance to the required standards. This information is not required to obtain a quote.

Support Equipment:

IALabs requires our customers provide all support equipment necessary to fully operate the EUT. This includes any filters required for testing radio devices.

Item	Description	Manufacturer	Model No.
1	Reader	AWS	EZR-43RO
2	Trigger	AWS	EZCC-7500
3			
4			

Cabling Information:

Cable	Function*	Type of Shield	Length	Connectors	Connection**
1					
2					
3					
4					
5					
6					

* Function examples (Ethernet, RS232, USB, Analog, physiological parameter, etc.)

** Connection examples (Outside Plant, Patient Coupled, Ring Voltage, etc.)

Monitoring the EUT:

Please provide instructions below on how to observe the EUT to verify proper operation in all modes. (including software revision)

Any other information required: (Notes, Photos, Block Diagrams, Drawings, etc.)

A minimum of a block diagram showing the equipment under test and its support equipment.

For International Approvals Laboratories, Use Only.
Please do not fill in the following Information.

Quoting Engineer: Todd			
Emissions Testing Required			
☐ Class A ☐ Class B ☒ Radio Device ☐ Group 1 ☐ Group 2			
☒ FCC Part 15	☐ ICES-003	☐ VCCI	
☐ FCC Part 18	☐ BSMI	☐ CISPR 22/EN 55022	
☐ CISPR 11/EN 55011	☐ IEC/EN 61326	☐ IEC/EN61000-6-3	
☐ IEC/EN61000-6-4	☐ CNS13438	☐ AS/NZS 3548	
☐ IEC/EN61000-3-2	☐ IEC/EN61000-3-3	☒ ETSI/EN 301 489	
☒ Other: ETSI 300 220 and FCC Part 15.231 Sections A & E Unintentional and intentional to 4.5GHz starting at 38kHz			
OATS Testing Voltages			
☐ 100VAC/50 Hz	☐ 120VAC/60Hz	☐ 230VAC/50Hz	
☐ 110VAC/60Hz	☐ 220VAC/60Hz	☐ 240VAC/50Hz	
☒ Other: Battery Operated... make sure there are fresh batteries			
Immunity Product Family Standard			
☐ CISPR24/EN 55024	☐ IEC/EN 61000-6-1	☐ IEC/EN 61000-6-2	
☐ IEC/EN 60601-1-2 ☐ Art. Hand.	☐ IEC/EN 61326	☐ CISPR14/ EN 55014-2	
☒ ETSI/EN 301 489	☐ Add Israel Frequencies		
☐ Other:			
Immunity Methods			
☒ EN61000-4-2	☒ 4kV/8kV ☐ 6kV/8kV	☐ 8kV ☐ 12kV ☐ 15kV	☐ Other: Normal testing (3)
☒ EN61000-4-3	☒ 3V/m ☐ 10V/m	☒ 1 kHz Modulation ☐ 400 Hz Modulation ☐ 2 Hz Modulation	☐ Other: 80MHz - 2.5 GHz standard currently stops at 2GHz but 2.5 will be in standard soon (6)
☒ EN61000-4-4	☐ 0.5 kV ☐ 1.0 kV	☐ 2.0 kV	☐ Other:
☐ EN61000-4-5	☐ 0.5 kV ☐ 1.0 kV	☐ 2.0 kV ☐ 4.0 kV	☐ Other:
☐ EN61000-4-6	☐ 3Vrms ☐ 10Vrms	☐ 1 kHz Modulation ☐ 400 Hz Modulation ☐ 2 Hz Modulation	☐ Other:
☒ EN61000-4-8	☒ 1A/m ☐ 30A/m	☐ 400A/m	☒ Other: Not in standard but still test it will be in standard soon (1)
☐ EN61000-4-11	☐ >95% 0.5 Cycles ☐ 30% 0.5 Cycles ☐ 60% 5 Cycles ☐ 60% 50 Cycles	☐ 30% 25 Cycles ☐ >95% 250 Cycles ☐ >95% 1 Cycle	☒ Other: Thermal testing and voltage stability testing - (6)
Test Reports Requested			
☐ Emissions		☐ Engineering Data Only	☒ ETSI "Radio"
☐ Immunity		☒ FCC/Industry Canada "Radio"	☐ Other:
☒ Other/special notes: There is a total of 2 tags and therefore 2 separate sets of reports need compiled. Please use -1a and -1b report numbering to segregate the reports			
Test procedure: Complete unintentional emissions (Trigger and both tags on table - trigger activated and button pressed) The reader can go on the floor because it is support equipment and the supporting computer can go beneath the			

ground reference plane because it is support equipment as well -- make sure that the ethernet cable is ferrited under the table coming up to the reader device) testing at 10m for unintentional up to 1GHz and 3m above 1GHz. A NOTE MUST E INSERTED IN THE REPORT STATING THAT THE TESTING WAS COMPLETED IN ACCORDANCE TO CISPR 30-1000MHz --- BELOW 30MHz USE THE STATED IN THE REPORT

Test both tags for intentional emissions measureing the emissions in both Peak and QP for sections A and E of FCC Part 15.231on worst case axis (record all testing for worst case axis --- must retest Axis at each power level of the tag "A & E")

Test and record the transmit time of each tag while operating under Part A power

Test the bandwidth requirements under subpart C for all modes of operation

There are 2 tags that operate under sections A and E of FCC CFR47 Part 15.231 - Therefore, there will be a total of 4 separate tests for intentional radiation for this test

After all FCC Testing is completed in every mode of operation, we will set up for signal substitution measurements for ETSI where all signal substitution measurements will be taken. Mike must be available for this testing to help out and the portable tripod must be available for this testing along with 1 extera antenna. Each of the emissions must be remaximized at 10m distance for each of the tags operating modes (yes --- complete the intentional testing again at 10m) then substitute the products with a transmit antenna and maximize the signal in hieght. THis process is completely explained in section 8.3 of Also check spurious emissions with QP detector to cover section 8.7 (should have been completed in FCC testing --- read section 8.7 (must complete in avtive and standby modes of operation and recorded)

Section 8.1 & 8.8 will be tested in boulder with the thermal chamber

Total time in Pinewood - about 3 to 3.5 days in pinewood

Total Time in Boulder - 2 days (16)

Appendix C

Measurement Protocol

And

Test Procedures

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Conducted and radiated emission testing is performed according to the procedures in ANSI C63.4 & CNS13438.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

To convert between dB μ V and μ V, the following conversions apply:

- $\text{dB}\mu\text{V} = 20(\log \mu\text{V})$
- $\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$

RADIATED EMISSIONS

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the applicable limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example: At a Test Frequency of 30 MHz, with a peak reading on the spectrum analyzer or measuring receiver of 14 dB μ V:

Measured Level	+	Transducer & Cable Loss factor	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
(dB μ V)		(dB)		(dB μ V/m)	(dB μ V/m)		(dB μ V/m)		
14.0		14.9		28.9	40.0		28.9		-11.1

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 22GHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.

Radiated Emissions Diagram:

