ENGINEERING TEST REPORT

Automated Inventory Control System (AICS) Asset Tag
Model No: GSAM-ATB-01

FCC ID: N6OGSAMATB01

FCC PART 15, SUBPART C, PARA. 15.249
LOW POWER TRANSMITTERS
Operating at 904.512 MHz

UltraTech's FILE NO.: GCI1-FTX

TESTED FOR:

GEMSTAR COMMUNICATIONS INC.
760 Pacific Road, Unit 7
Oakville, Ontario
Canada, L6L 6M5

TESTED BY:

UltraTech Engineering Labs Inc.
4181 Sladeview Crescent, Unit 33
Mississauga, Ontario
Canada L5L 5R2

PREPARED BY: Dan Huynh

DATE: August 25, 1998

TABLE OF CONTENTS

1. EXHIBIT 1 - SUMMARY OF TEST RESULTS & GENERAL STATEMENT OF CERTIFICATION 3

2. EXHIBIT 2 - GENERAL INFORMATION 4

2.1. APPLICANT 4
2.2. MANUFACTURER 4
2.3. DESCRIPTION OF EQUIPMENT UNDER TEST 4
2.4. RELATED SUBMITTAL(S)/GRANT 5
2.5. TEST METHODOLOGY 5
2.6. TEST FACILITY 5
2.7. UNITS OF MEASUREMENTS 5

3. EXHIBIT 3 - SYSTEM TEST CONFIGURATION 6

BLOCK DIAGRAMS FOR CONDUCTED & RADIATED EMISSION MEASUREMENTS 6
3.2. PHOTOGRAPH FOR RF EMISSION MEASUREMENTS 7
3.3. JUSTIFICATION 10
3.4. EUT OPERATING CONDITION 10
3.5. SPECIAL ACCESSORIES 10
3.6. EQUIPMENT MODIFICATIONS 10

4. EXHIBIT 4 - TEST DATA 11

4.1. TRANSMITTER FUNDAMENTAL & HARMONIC RADIATED EMISSIONS @ FCC CFR 47, PARA 15.249(A) 11
4.2. RF EXPOSURE LIMIT FCC 1.1310 18

5. EXHIBIT 5 - GENERAL TEST PROCEDURES 20

5.1. ELECTRICAL FIELD RADIATED EMISSIONS MEASUREMENTS - GENERAL TEST METHOD 20

6. EXHIBIT 6 - INFORMATION RELATED TO EQUIPMENT UNDER TESTS 23

6.1. FCC ID LABELING AND SKETCH OF FCC LABEL LOCATION 23
6.2. PHOTOGRAPHS OF EQUIPMENT UNDER TEST 23
6.3. SYSTEM BLOCK DIAGRAM(S) 23
6.4. SCHEMATIC DIAGRAMS 23
6.5. USER'S MANUAL WITH "FCC INFORMATION TO USER STATEMENTS" 23

1. EXHIBIT 1 - SUMMARY OF TEST RESULTS & GENERAL STATEMENT OF CERTIFICATION

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.249(a), 15.209, 15.205 & 1.1310	Transmitter Radiated Emissions, Harmonic Emissions and RF Exposure Limit	Yes
15.107(a)	AC Power Conducted Emissions	Not applicable for battery operated device.

TESTIMONIAL AND STATEMENT OF CERTIFICATION

THIS IS TO CERTIFY:

1) *THAT the application was prepared either by, or under the direct supervision of the undersigned.*

2) *THAT the measurement data supplied with the application was taken under my direction and supervision.*

3) *THAT the data was obtained on representative production units, representative.*

4) *THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.*

Certified by:

_____

Tri Minh Luu, P. Eng.
V.P., Engineering

DATE: August 25, 1998

2. EXHIBIT 2 - GENERAL INFORMATION

2.1. Applicant

GEMSTAR COMMUNICATIONS INC.
760 Pacific Road, Unit 7
Oakville, Ontario
Canada, L6L 6M5

Applicant's Representative: Mr. Richard Bonham

2.2. Manufacturer

GEMSTAR COMMUNICATIONS INC.
760 Pacific Road, Unit 7
Oakville, Ontario
Canada, L6L 6M5

2.3. Description of Equipment under Test

PRODUCT NAME:	Automated Inventory Control System (AICS) Asset Tag
SERIAL NUMBER:	2200000001
TYPE OF EQUIPMENT:	DSSS Transmitters
OPERATING FREQ.:	904.512 MHz
BANDWIDTH (26 dB OBW):	14.0 kHz
POWER RATING:	0.0443 mW EIRP
EMISSION DESIGNATION:	14K0G1D
DUTY CYCLE:	8.71%
OSC. FREQUENCY(IES):	32.768 kHz, 4 MHz and 14.133 MHz
INPUT SUPPLY:	6V Lithium Internal Battery
ASSOCIATED DEVICES:	Gemstar AICS MicroCell, Model: GSAM-CEL-01
FCC ID:	N6OGSAMATB01
INTERFACE PORTS:	(1) Asset Tag Activation Interface Port

2.4. Related Submittal(s)/Grant

The associated receiver of this EUT (Gemstar AICS Asset Tag, Model GSAM-ATB-01), which is called Gemstar AICS Micro-Cell, Model GSAM-CEL-01, has been tested and found to comply with the FCC Part 15, Subpart B – All other receivers. The FCC Declaration of Conformity Authorization is applied for this type of receiver.

2.5. Test Methodology

These tests were conducted on a sample of the equipment for the purpose of certification compliance with Code of Federal Regulations (CFR47-1991), Part 15, Subpart C, Para. 15.249, Low Power Transmitters operating at 904.512 MHz.

Radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4-1992 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

2.6. Test Facility

Radiated Emissions were performed at the UltraTech's 3-to-10 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario.

The above sites have been calibrated in accordance with ANSI C63.4-1992, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3). Last Date of Site Calibration: June 05, 1996

The above test site is also filed with Interference Technology International Ltd (ITI - An EC Directive on EMC).

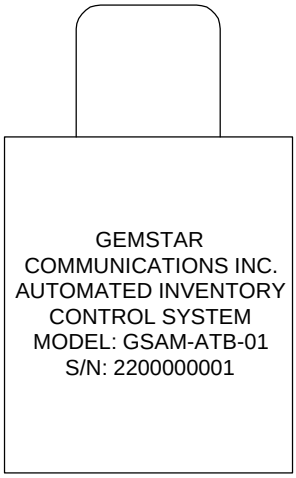
2.7. Units of Measurements

Measurements of radiated emissions are reported in units of dB referenced to one microvolt per meter [dB(uV)/m] at the distance specified in the report, wherever it is applicable.

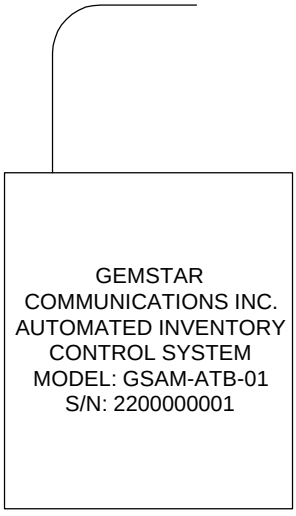
3. EXHIBIT 3 - SYSTEM TEST CONFIGURATION

3.1. Block Diagrams for Radiated Emission Measurements

Test Configuration 1: Tag Strap Connected



Test Configuration 2: Tag Strap Disconnected

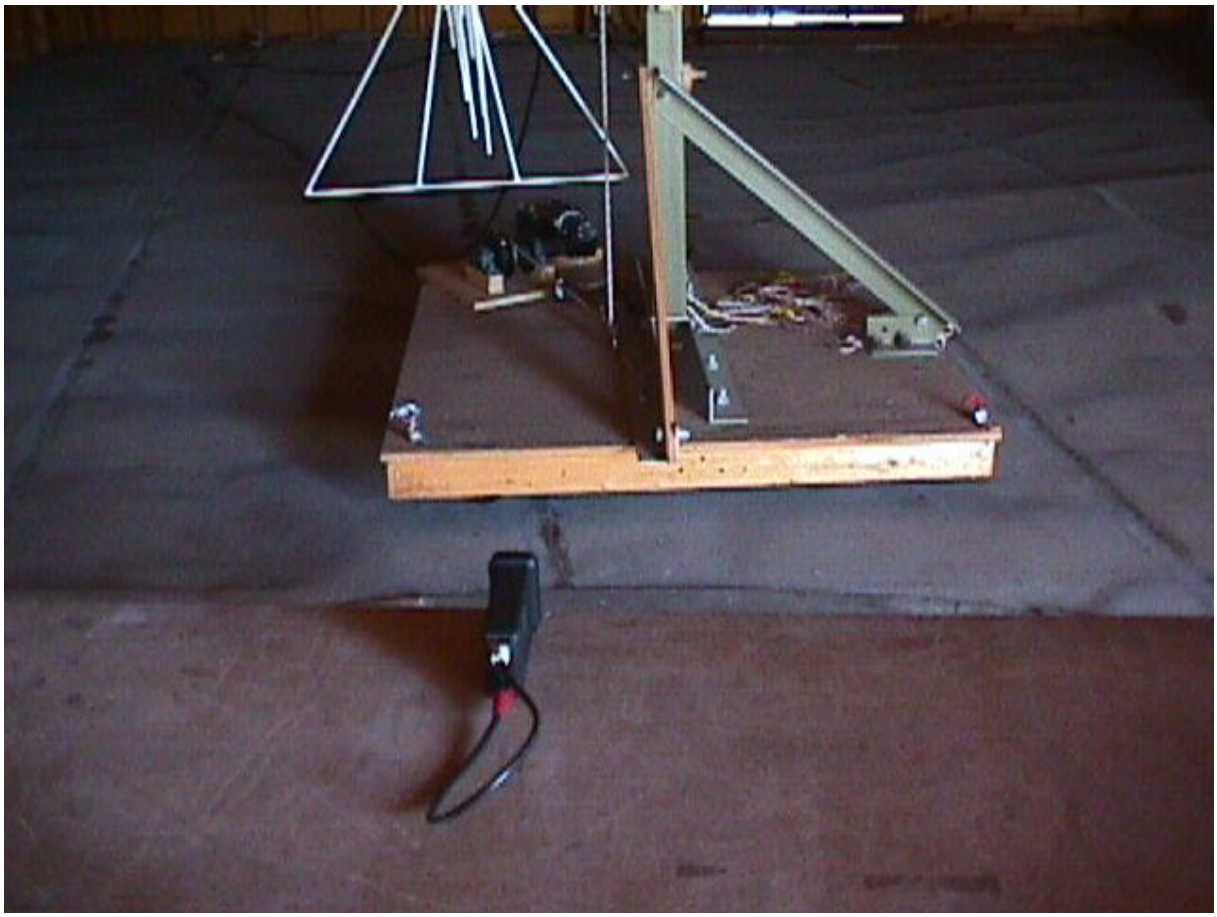


3.2. Photograph for RF Emission Measurements

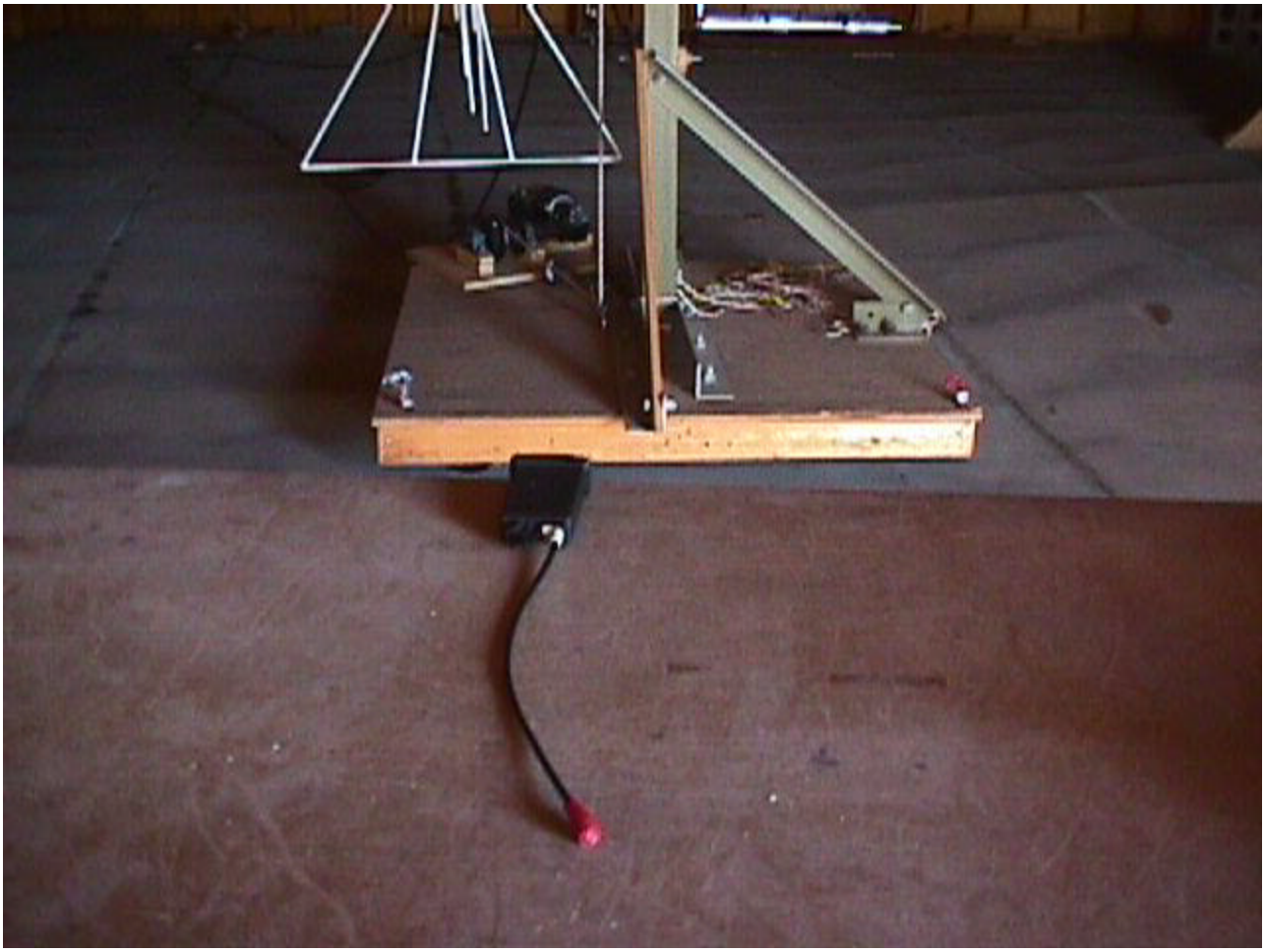
Please refer to the attached photos.

TEST SETUP FOR
RADIATED EMISSIONS MEASUREMENTS
(tests were performed at the Open Field test Site located in Oakville, Ontario, Canada)

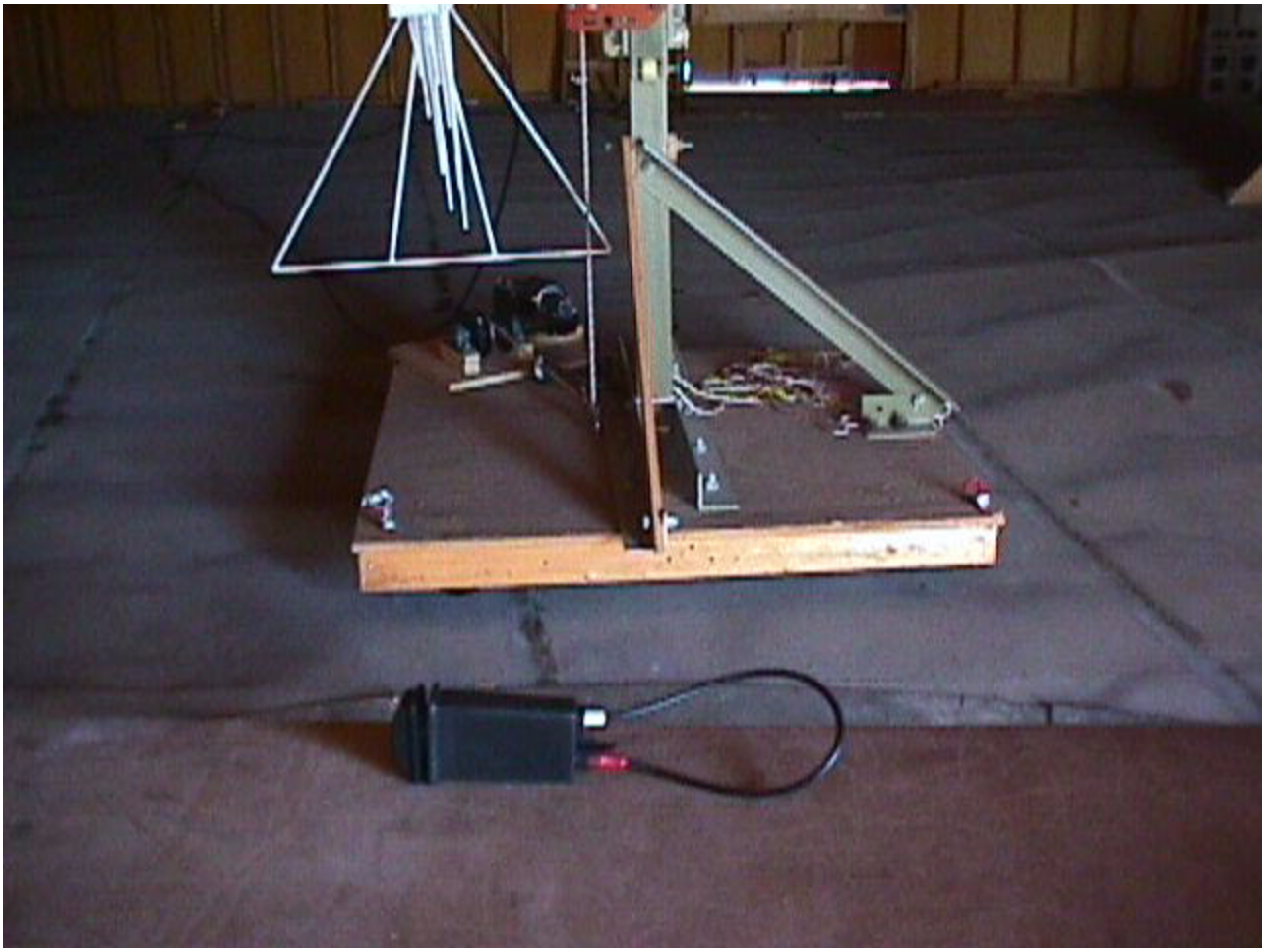
ORTHOGONAL POSITION #1



ORTHOGONAL POSITION #2



ORTHOGONAL POSITION #3



3.3. Justification

The transmitter was set to transmit continuously for testing purpose only. This is not normal operating condition.

3.4. EUT Operating Condition

The transmitter under test was specially wired to transmit continuously for convenience of rf emission measurements. The transmitter was tested with two configuration of the antenna: (1) disconnected from the Asset Tag Activation Interface Port and (2) connected to Asset Tag Activation Interface Port.

3.5. Special Accessories

No special accessories were required.

3.6. Equipment Modifications

To achieve compliance, the following change(s) were made by UltraTech's test house during compliance testing:

Not required.

4. EXHIBIT 4 - TEST DATA

4.1. Transmitter Fundamental & Harmonic Radiated Emissions @ FCC CFR 47, Para 15.249(a)

PRODUCT NAME: **Automated Inventory Control System (AICS) Asset Tag, Model No.: GSAM-ATB-01**

FCC REQUIREMENTS:

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

FUNDAMENTAL FREQUENCY	Field Strength of Fundamental @ 3m (dBuV/m)	Field Strength of Harmonics @ 3m (dBuV/m)
902 - 928 MHz	94.0	54.0

Remarks:

- Applies to harmonics/spurious emissions that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209.
- **@ FCC CFR 47, Para. 15.237(c)** - The emission limits as specified above are based on measurement instrument employing an average detector. The provisions in **@15.35** for limiting peak emissions apply.

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) - Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	162.0125 - 167.17	2310 - 2390	9.3 - 9.5
0.49 - 0.51	167.72 - 173.2	2483.5 - 2500	10.6 - 12.7
2.1735 - 2.1905	240 - 285	2655 - 2900	13.25 - 13.4
8.362 - 8.366	322 - 335.4	3260 - 3267	14.47 - 14.5
13.36 - 13.41	399.9 - 410	3332 - 3339	14.35 - 16.2
25.5 - 25.67	608 - 614	3345.8 - 3358	17.7 - 21.4
37.5 - 38.25	960 - 1240	3600 - 4400	22.01 - 23.12
73 - 75.4	1300 - 1427	4500 - 5250	23.6 - 24.0
108 - 121.94	1435 - 1626.5	5350 - 5460	31.2 - 31.8
123 - 138	1660 - 1710	7250 - 7750	36.43 - 36.5
149.9 - 150.05	1718.8 - 1722.2	8025 - 8500	Above 38.6
156.7 - 156.9	2200 - 2300	9000 - 9200	

FCC CFR 47, Part 15, Subpart C, Para. 15.209(a)
-- Field Strength Limits within Restricted Frequency Bands --

FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / F (KHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 ^{o}C
- Relative humidity: 51%

POWER INPUT:

6V Lithium Internal Battery

TEST EQUIPMENT:

- **Spectrum Analyzer**, Advantest, Model R3271, S/N: 15050203, 100 Hz to 32 GHz)
- **Microwave Amplifier**, HP, Model 83017, Frequency Range 0.5 to 26.5 GHz, 30dB gain nominal.
- **Active Loop Antenna**, Emco, Model 6507, SN 8906-1167, Frequency Range 1 KHz - 30 MHz, @ 50 Ohms
- **Log Periodic/Bow-Tie Antenna**, Emco, Model 3143, SN 1029, 20 - 1000 MHz, @ 50 ohms.
- **Log Periodic Antenna**, A.H. Systems, Model SAS-200/518, SN 343, Frequency Range: 1 - 18 GHz, @ 50 Ohms.

METHOD OF MEASUREMENTS:

Refer to **ANSI 63.4-1992, Para. 8** for detailed radiated emissions measurement procedures.

Applies to harmonics/spurious that fall in the restricted bands listed in Section 15.205. the maximum permitted average field strength is listed in Section 15.209. A Pre-Amp and highpass filter are used for this measurement.

For measurement below 1 GHz, set RBW = 100 KHz, VBW $\geq$ 100 KHz, SWEEP=AUTO.

For measurement above 1 GHz, set RBW = 1 MHz, VBW = 1 MHz (Peak) & VBW = 10 Hz (Average), SWEEP=AUTO.

If the emission is pulsed, modified the unit for continuous operation, then use the settings above for measurements, then correct the reading by subtracting the peak-average correction factor derived from the appropriate duty cycle calculation. See Section 15.35(b) and (c).

FCC CFR 47, Para. 2.997 - Frequency spectrum to be investigated

The spectrum was investigated from the lowest radio generated in the equipment up to at least the 10th harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

FCC CFR 47, Para. 2.993 - Field Strength Spurious Emissions

(a) Measurements was made to detect spurious emissions radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data were supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph 2.989(c) as appropriate. For equipment operating on frequencies below 1 GHz, an Open Field Test is normally required, with the measuring instrument antenna located in the far field at all test frequencies. In event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurement will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections, which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with the reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25 MHz
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the Commission.

TEST RESULTS: Conforms.

TEST PERSONNEL: Mr. Hung Trinh, Technician

DATE: August 25, 1998

MEASUREMENT DATA

RADIATED EMISSIONS MEASUREMENTS @ 3 METERS

TEST CONFIGURATION

- *This lowest, middle and highest channels were established at its full rated output power. The emissions were investigated from the lowest frequency generated by the transmitter up to the 10th harmonic of the fundamental emissions in each case. the measured level of the carrier was recorded and compared to the level of the emissions as required in Parts 15.249(c) or 15.209(a) whichever was applicable.*
- *For measuring radiated emissions at frequencies below 1 GHz, the Spectrum Analyzer was set as 100 KHz RBW, VBW ≥ RBW, SWEEP TIME: AUTO, PEAK DETECTOR.*
- *For measuring radiated emissions at frequencies above 1 GHz, the Spectrum Analyzer was set as 1 MHz RBW, 1 MHz VBW, SWEEP TIME: AUTO for PEAK measurements and 1 MHz RBW, 10 Hz VBW, SWEEP TIME: AUTO for AVERAGE measurements.*
- *The following measurements were the worst cases when the radiating antenna was placed in both horizontal and vertical polarization.*
- *The following **AVERAGE** rf levels were obtained from either Peak or Average readings added by the duty cycle correction factor. **DUTY CYCLE FACTOR = $20LOG_{10}(0.0871)$ = -21 dB***

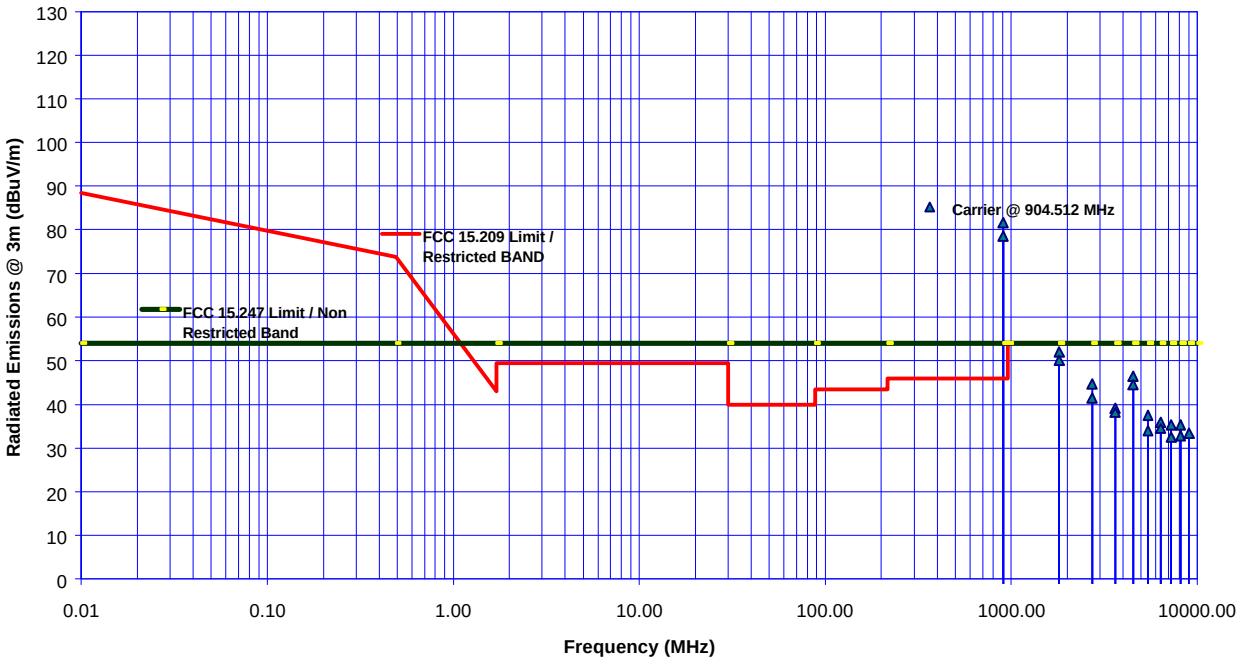
Test Configuration #1: Antenna is connected to Asset Tag Activation Interface Port

The radiated emissions tests were repeated with the EUT placed in three different orthogonal positions (back down, stand up and side up), and the worst case of measurements were recorded as follows:

CHANNEL FREQUENCY TESTED: 904.512 MHz							
FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
904.51	98.53	78.53	V	--	94.0	-15.5	PASS
904.51	101.59	81.59	H	--	94.0	-12.4	PASS
1809.02	72.06	52.06	V	54.0	54.0	-1.9	PASS
1809.02	70.09	50.09	H	54.0	54.0	-3.9	PASS
2713.54	64.63	44.63	V	54.0	54.0	-9.4	PASS**
2713.54	61.47	41.47	H	54.0	54.0	-12.5	PASS**
3618.05	59.16	39.16	V	54.0	54.0	-14.8	PASS**
3618.05	58.16	38.16	H	54.0	54.0	-15.8	PASS**
4522.56	66.41	46.41	V	54.0	54.0	-7.6	PASS**
4522.56	64.59	44.59	H	54.0	54.0	-9.4	PASS**
5427.07	57.53	37.53	V	54.0	54.0	-16.5	PASS**
5427.07	53.91	33.91	H	54.0	54.0	-20.1	PASS**
6331.58	55.88	35.88	V	54.0	54.0	-18.1	PASS
6331.58	54.50	34.50	H	54.0	54.0	-19.5	PASS
7236.10	55.34	35.34	V	54.0	54.0	-18.7	PASS**
7236.10	52.59	32.59	H	54.0	54.0	-21.4	PASS**
8140.61	55.28	35.28	V	54.0	54.0	-18.7	PASS**
8140.61	52.78	32.78	H	54.0	54.0	-21.2	PASS**
9045.12	53.44	33.44	V	54.0	54.0	-20.6	PASS**
9045.12	--	--	H	54.0	54.0	--	PASS**
No other significant emissions were found in the frequency range from 10 MHz to 10 GHz. Refer to attached plots for details							

***** Emission within the restricted band specified in @ 15.205(a)***

Transmitter Radiated Emissions Measurements at 3 Meter OFTS
Automated Inventory Control System
Model: GSAM-ATB-01
TRANSMIT Freq.: 904.512 MHz



Test Configuration #2: Antenna is disconnected from Asset Tag Activation Interface Port

The radiated emissions tests were repeated with the EUT placed in three different orthogonal positions (back down, stand up and side up), and the worst case of measurements were recorded as follows:

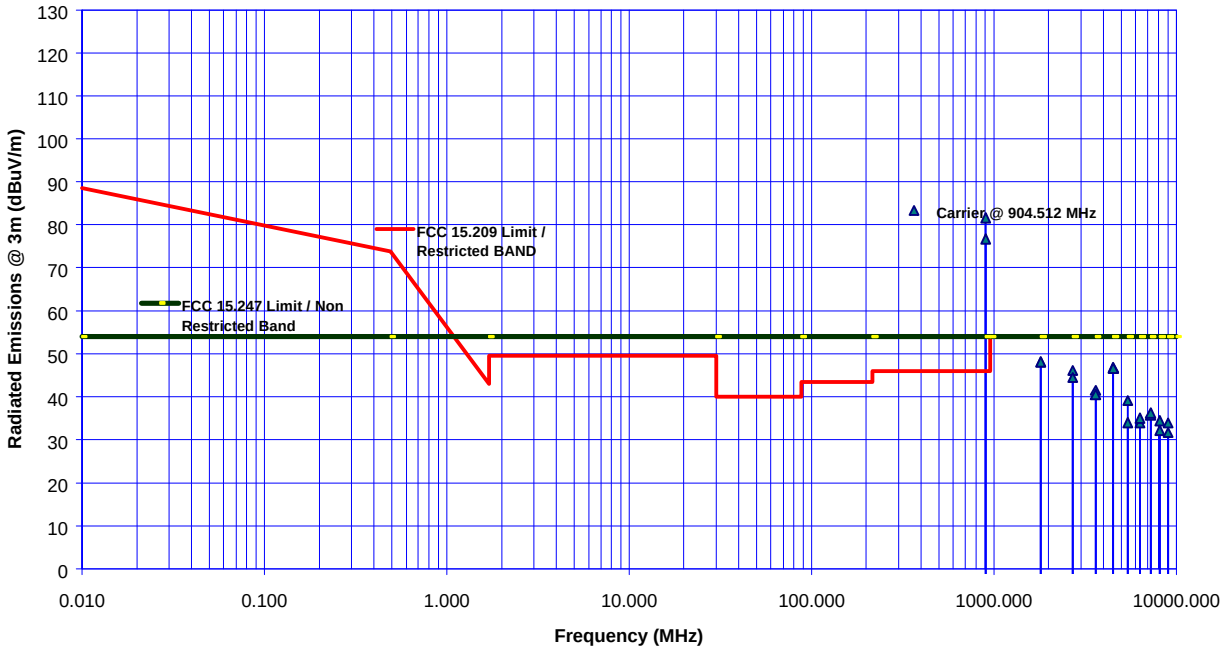
CHANNEL FREQUENCY TESTED: 904.512 MHz

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
904.51	96.72	76.72	V	46.0	94.0	-17.3	PASS
904.51	101.69	81.69	H	46.0	94.0	-12.3	PASS
1809.02	68.06	48.06	V	54.0	54.0	-5.9	PASS
1809.02	68.09	48.09	H	54.0	54.0	-5.9	PASS
2713.54	66.13	46.13	V	54.0	54.0	-7.9	PASS**
2713.54	64.47	44.47	H	54.0	54.0	-9.5	PASS**
3618.05	61.47	41.47	V	54.0	54.0	-12.5	PASS**
3618.05	60.56	40.56	H	54.0	54.0	-13.4	PASS**
4522.56	66.81	46.81	V	54.0	54.0	-7.2	PASS**
4522.56	66.66	46.66	H	54.0	54.0	-7.3	PASS**
5427.07	59.09	39.09	V	54.0	54.0	-14.9	PASS**
5427.07	53.97	33.97	H	54.0	54.0	-20.0	PASS**
6331.58	53.94	33.94	V	54.0	54.0	-20.1	PASS
6331.58	55.03	35.03	H	54.0	54.0	-19.0	PASS
7236.10	55.69	35.69	V	54.0	54.0	-18.3	PASS**
7236.10	56.25	36.25	H	54.0	54.0	-17.8	PASS**
8140.61	54.44	34.44	V	54.0	54.0	-19.6	PASS**
8140.61	52.22	32.22	H	54.0	54.0	-21.8	PASS**
9045.12	53.91	33.91	V	54.0	54.0	-20.1	PASS**
9045.12	51.72	31.72	H	54.0	54.0	-22.3	PASS**

No other significant emissions were found in the frequency range from 10 MHz to 10 GHz. Refer to attached plots for details

***** Emission within the restricted band specified in @ 15.205(a)***

Transmitter Radiated Emissions Measurements at 3 Meter OFTS
Automated Inventory Control System
Model: GSAM-ATB-01
TRANSMIT Freq.: 904.512 MHz



4.2. RF Exposure Limit FCC 1.1310

PRODUCT NAME: **Automated Inventory Control System (AICS) Asset Tag, Model No.: GSAM-ATB-01**

FCC REQUIREMENTS:

FCC 1.1310:- The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2) *	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
30-300	61.4	0.163	1.0	6
300-1500	...	...	F/300	6
(B) Limits for General Population/Uncontrolled Exposure				
30-300	27.5	0.073	0.2	30
300-1500	...	...	F/1500	30

F = Frequency in MHz
* = Plane-wave equivalent power density

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23+3 °C
- Relative humidity: 50+5 %
- Atmospheric Pressure: 100+5 kPa

POWER INPUT: 6V Lithium Internal Battery

METHOD OF MEASUREMENTS:

FCC @ 1.1310 & OST Bulletin No. 65-October 1985

$S = PG/4\Pi r^2 = EIRP/4\Pi r^2$

Where: P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$$r = \sqrt{PG/4\Pi S}$$

FCC radio frequency exposure limits may not be exceeded at distances closer than r cm from the antenna of this device.

TEST RESULTS: Conforms.

TEST PERSONNEL: Mr. Hung Trinh, Technician

DATE: August 25, 1998

MEASUREMENT DATA:

EFFECTIVE ISOTROPIC RADIATED POWER (EIRP) MEASURED AT 3 METER DISTANCE (Substitution Method)

TX CHANNEL OUTPUT	FUNDAMENTAL FREQUENCY (MHz)	Tx Antenna Gain (Numeric)	Max. Field Strength Level @ 100 KHz BW At 3 m (dBuV/m)	Max. EIRP POWER In a 100 KHz BW (mW)	POWER LIMIT (mW)
Single channel output	904.512	1	81.69	0.0443	N/A

RF EXPOSURE DISTANCE LIMITS: $r = (PG/4\Pi S)^{1/2}$

G= 1 numeric, S = F/1500 = 0.60 mW/cm^2 (F in MHz)

TRANSMITTER CHANNEL OUTPUT	FUNDAMENTAL FREQUENCY (MHz)	MEASURED EIRP FULL POWER (mWatts)	MNIMUM ALLOWABLE DISTANCE (r) FROM SKIN (Centi-Meter)
Single channel output	904.512	0.0443	0.076

Since the power density of 0.60 mW/cm^2 is at a very short distance (0.076 cm) from the radiating antenna and the e.i.r.p. power at the antenna (0.044 mW) is very much lower than this power density limit , the RF exposure limit warning or SAR tests are not necessary.

5. EXHIBIT 5 - GENERAL TEST PROCEDURES

5.1. Electrical Field Radiated Emissions Measurements - General Test Method

- The radiated emission measurements were performed at the UltraTech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario. The Attenuation Characteristics of OFTS have been filed to FCC.

- Radiated emissions measurements were made using the following test instruments:

    1) Calibrated EMCO active loop antenna in the frequency range from 10 KHz to 1 MHz
    2) Calibrated EMCO biconilog antenna in the frequency range from 30 MHz to 2000 MHz.
    3) Calibrated A.H. Systems log periodic antenna in the frequency range above 1000 MHz (1GHz - 18 GHz).
    4) Horn Antennas:
        a) Horn Antenna, Emco, Model 3160-09, 18-26.5GHz
        b) Horn Antenna, Emco, Model 3160-10, 26.5-40GHz
        c) Mixer, Tektronix, P/N 118-0098-00, 18-26.5GHz
        d) Mixer, Tektronix, P/N 119-0098-00, 26.5-40GHz
        e) Mixer, HP, P/N R3434A, 12.4-18GHz
        f) Mixer, HP, P/N R3434B, 18-26.5GHz
        g) Mixer, HP, P/N R3434C, 26.5-40GHz
    5) Calibrated Advantest spectrum analyzer and pre-selector/pre-amplifier. In general, the spectrum analyzer would be used as follows:

        – The rf electric field levels were measured with the spectrum analyzer set to PEAK detector (1 KHz RBW and 1 KHz VBW for frequency below 30 MHz, 100 KHz RBW and VBW $\geq$ RBW for Frequency below 1 GHz and 1 MHz RBW and 1 MHz VBW for frequency greater than 1 GHz).

        – If any rf emission was observed to be a broadband noise, the spectrum analyzer's CISPR QUASI-PEAK detector (120 KHz RBW and 1MHz VBW) was then set to measure the signal level.

        – If the signal being measured was narrowband and the ambient field was broadband, the bandwidth of the spectrum analyzer was reduced.

- The EUT was set-up in its typical configuration and operated in its various modes as described in 3.2 of the test report.

- The frequencies of emissions was first detected. Then the amplitude of the emissions was measured at the specified measurement distance using required antenna height, polarization, and detector characteristics.

- During this process, cables and peripheral devices were manipulated within the range of likely configuration.

- For each mode of operation required to be tested, the frequency spectrum was monitored. Variations in antenna heights (from 1 meter to 4 meters above the ground plane), antenna polarization (horizontal plane and vertical plane), cable placement and peripheral placement (each variable within bounds specified elsewhere) were explored to produce the highest amplitude signal relative to the limit.

The maximum radiated emission for a given mode of operation was found by using the following step-by-step procedure:

Step1: Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.

Step2: Manipulate the system cables to produce highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.

Step3: Rotate the EUT 360 degrees to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, go back to the azimuth and repeat Step 2. Otherwise, orient the EUT azimuth to repeat the highest amplitude observation and proceed.

Step4: Move the antenna over its full allowed range of travel (1 to 4 meters) to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to Step 2 with the highest amplitude observation and proceed.

Step5: Change the polarization of the antenna and repeat Step 2 through 4. Compare the resulting suspected highest amplitude signal with that found for the other polarization. Select and note the higher of the two signals. This signal is termed the highest observed signal with respect to the limit for this EUT operational mode.

Step6: The effects of various modes of operation is examined. This is done by varying the equipment modes as steps 2 through 5 are being performed.

Step7: After completing steps 1 through 6, record the final highest emission level, frequency, antenna polarization and detector mode of the measuring instrument.

Calculation of Field Strength:

The field strength is calculated by adding the calibrated antenna factor and cable factor, and subtracting the Amplifier gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where	FS	=	Field Strength
	RA	=	Receiver/Analyzer Reading
	AF	=	Antenna Factor
	CF	=	Cable Attenuation Factor
	AG	=	Amplifier Gain

Example: If a receiver reading of 60.0 dBuV is obtained, the antenna factor of 7.0 dB/m and cable factor of 1.0 dB are added, and the amplifier gain of 30 dB is subtracted. The actual field strength will be:.

Field Level in dBuV/m = 60 + 7.0 + 1.0 - 30 = 38.0 dBuV/m.

Field Level in uV/m = $10^{(38/20)}$ = 79.43 uV/m.

Notes: The frequency and amplitude of at least six highest conducted emissions relative to the limit are recorded unless such emissions are more than 20 dB below the limit. If less than six emissions are within 20dB of the limit, the background or receiver noise level shall be reported at representative frequencies.

6. EXHIBIT 6 - INFORMATION RELATED TO EQUIPMENT UNDER TESTS

6.1. FCC ID Labeling and Sketch of FCC Label Location

Refer to "FCCLable.PDF" file.

6.2. Photographs of Equipment under Test

Refer to "TagPhoto.PDF" file

6.3. System Block Diagram(s)

Refer to "block_di.PDF file.

6.4. Schematic Diagrams

Refer to "Schematic.PDF" file.

6.5. User's Manual with "FCC Information to User Statements"

Refer to "UserManual.PDF" file.