UltraTech
Group of Labs

May 8, 2000

INDUSTRY CANADA
Head, Equipment Approval Unit
3701 Carling Avenue, Bldg. # 94
P.O. Box 11490, Station "H"
Ottawa, Ontario
K2H 8S2

Subject: **Certification Application under Industry Canada RSS-210, Issue Draft 2, Sec. 6.2.2(m2), Low Power Transmitters (916.5 MHz) and Sec. 7 – Radio Receivers (916.5 MHz)**

Applicant: **GEMSTAR COMMUNICATIONS INC.**
Product: **TDMA Activator**
Model: **GSPS-ACT-02**

Dear Sir/Madam,

As appointed agent for **GEMSTAR COMMUNICATIONS INC.**, please find enclosed copy of the engineering report, application form and a cheque of Cdn $ _____.

Note that the above mentioned product will be professionally install by qualified personnel.

If you have any queries, please do not hesitate to contact us by our TOLL FREE numbers:

OUR TELEPHONE NO.: 1-877-765-4173

Yours truly,

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

TML/AK

Encl.

3000 Brsitol Circle,
Oakville, Ontario, Canada
L6H 6G4

Telephone (905) 829-1570
Facsimile (905) 829-8050

Website: www.ultratech-labs.com
Email: vhk.ultratech@sympatico.ca

UltraTech
Group of Labs

May 8, 2000

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

Attn.: **Mr. Richard Bonham**

Subject: **Certification Application under Industry Canada RSS-210, Issue Draft 2, Sec. 6.2.2(m2), Low Power Transmitters (916.5 MHz) and Sec. 7 – Radio Receivers (916.5 MHz)**

Product: **TDMA Activator**
Model: **GSPS-ACT-02**

Dear Mr. Bonham,

The product sample, as provided by you, has been tested and found to comply with Certification Application under Industry Canada RSS-210, Issue Draft 2, Sec. 6.2.2(m2), Low Power Transmitters (916.5 MHz) and Sec. 7 – Radio Receivers (916.5 MHz)

We, UltraTech Engineering Labs Inc., as appointed agent for **GEMSTAR COMMUNICATIONS INC.**, will prepare the application to INDUSTRY CANADA (CANADA) for authorization of this equipment under Certification requirements of CANADA Rules. The engineering report and required application documents have been submitted to CANADA for inspection.

Enclosed you will find copies of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,

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

Encl.

3000 Brsitol Circle,
Oakville, Ontario, Canada
L6H 6G4

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Email: vhk.ultratech@sympatico.ca

ENGINEERING TEST REPORT

TDMA Activator
Model No: GSPS-ACT-02

Certification Application under Industry Canada RSS-210, Issue Draft 2, Sec. 6.2.2(m2), Low Power Transmitters (916.5 MHz) and Sec. 7 – Radio Receivers (916.5 MHz)

UltraTech's FILE NO.: GCI7-IC

TESTED FOR:

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

TESTED BY:

UltraTech Engineering Labs Inc.
3000 Bristol Circle
Oakville, Ontario
Canada L6H 6G4

DATE: May 8, 2000

TABLE OF CONTENTS

1. EXHIBIT 1 - ATTESTATION

The Radio apparatus identified in this application has been subject to all the applicable test conditions specified in RSS-210 and all of the requirements of the Standard have been met.

Tri M. Luu, P.Eng.
Vice President of Engineering
Ultratech Engineering Labs Inc.

May 8, 2000

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:	TDMA Activator
SERIAL NUMBER:	Pre-production
TYPE OF EQUIPMENT:	Low Power Devices
OPERATING FREQ.:	916.5 MHz
BANDWIDTH (26 dB OBW):	96.0 kHz
POWER RATING:	0.45 mW EIRP
EMISSION DESIGNATION:	96K0K1D
DUTY CYCLE:	37.9%
CPU SPEED:	4.00 MHz
INPUT SUPPLY:	9 Vdc via AC Adaptor
ASSOCIATED DEVICES:	Gemstar Lettermail Tag, Model GSPS-LMT-02, FCC ID: N6OGSPS-LMT-02
INTERFACE PORTS:	TNC Interface F Type Interface DC Jack Interface

2.4. Related Submittal(s)/Grant

Not applicable.

2.5. Test Methodology

These tests were conducted on a sample of the equipment for the purpose of certification compliance with Industry Canada RSS-210, Issue Draft 2, Section 6.2.2(m2).

Both conducted and radiated emissions measurements were conducted in accordance with Industry Canada RSS-210, Issue 2 and 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

AC Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).

Radiated Emissions were performed at the Ultratech's 3-10 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, 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) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: September 20, 1999.

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

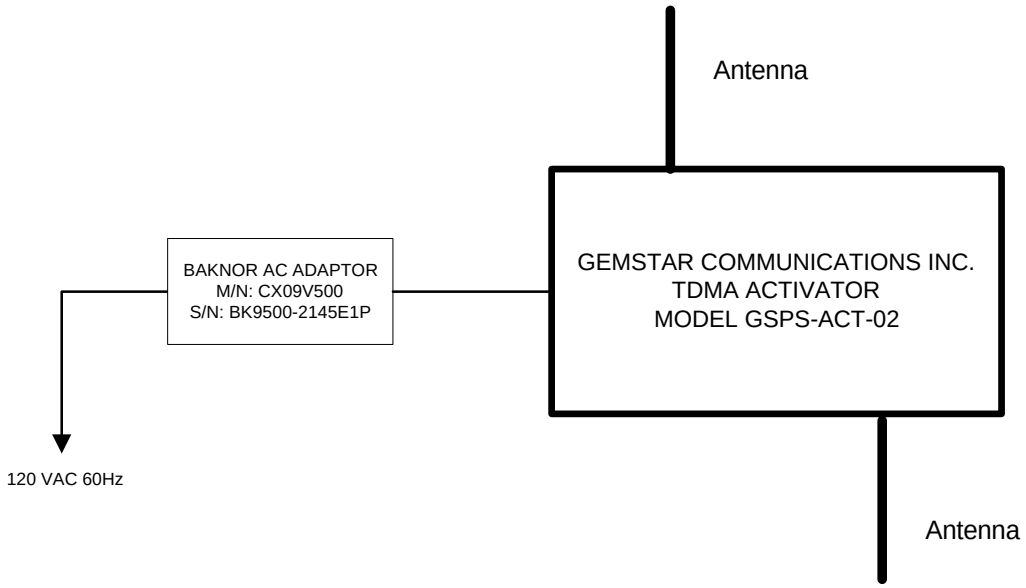
2.7. Units of Measurements

Measurements of conducted emissions are reported in units of dB referenced to one microvolt [dB(uV)].

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 RF Emission Measurements



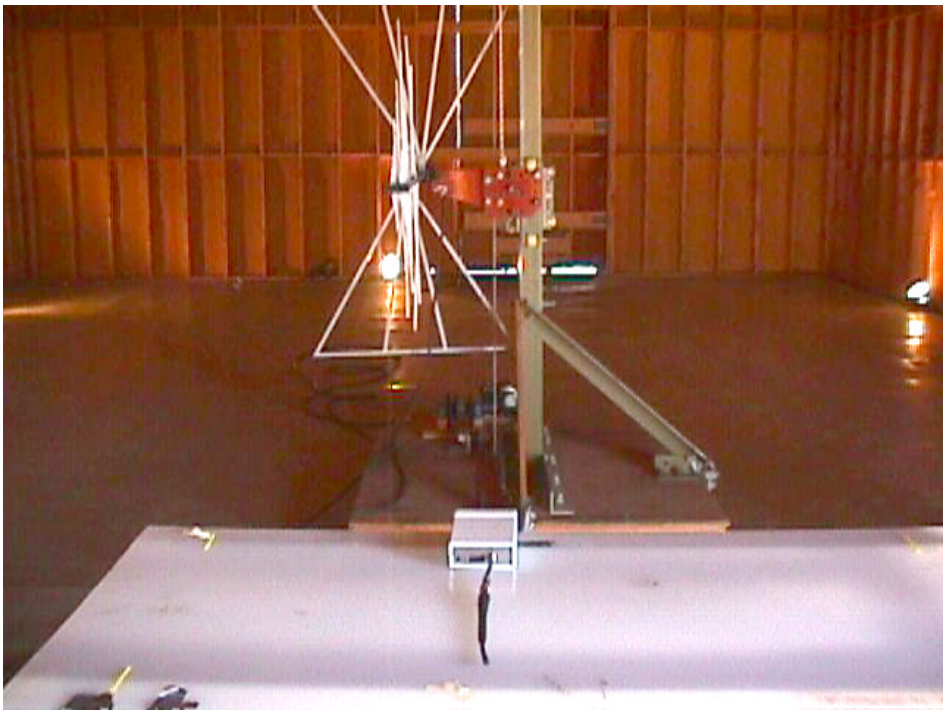
3.2. Photograph for RF Emission Measurements

3.2.1. TEST SETUP FOR AC POWER LINE CONDUCTED EMISSIONS MEASUREMENTS

Tests were performed in the screen room

3.2.2. TEST SETUP FOR RADIATED EMISSIONS MEASUREMENTS

Tests were performed at the Open Field test Site located in Oakville, Ontario, Canada



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 was set to operate continuously for testing.

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:

None.

4. EXHIBIT 4 - TEST DATA

4.1. Industry Canada, RSS-210, Issue Draft 2, Section 6.2.2(m2), Field Strength Measurements at 3 Meters

PRODUCT NAME: **TDMA Activator, Model No.: GSPS-ACT-02**

INDUSTRY CANADA REQUIREMENTS:

The RF radiated emissions measured at 3 meters distance shall not exceed the field strength listed in RSS-210, Issue Draft 2, Section 6.2.2.(m2)(1):

Fundamental Frequency (MHz)	Field Strength of Fundamental @ 3 Meters (μV/m)	Field Strength of Unwanted Emissions @ 3 Meters (μV/.m)
902-928	50000	500

Radiated Limits for Transmitter @ 916.5 MHz

Fundamental Frequency (MHz)	Field Strength of Fundamental @ 3 Meters (dBμV/m)	Field Strength of Unwanted Emissions @ 3 Meters (dBμV/m)
916.5	94	54

The spurious/harmonic emissions which fall inside the restricted bands of operation (Table 2) shall not exceed the limits specified in Table 3.

RSS-210, Issue 2, Table 2- Restricted Bands of Operation

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	

RSS-210, Issue 2, Table 3 - Field Strength Limits within Restricted Frequency Bands

FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
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: 45 %

TEST EQUIPMENT:

- **EMI Receiver System/Spectrum Analyzer**, Hewlett Packard, Model 8546A, Input +25dBm max., 9KHz-5.6GHz, 50 Ohms, built-in Peak, Quasi-Peak & Average Detectors, Pre-Amplifier and Tracking Signal Generator. This System includes: (1) HP 85460A RF Filter Section, S/N: 3448A00236 and (2) HP 85462A Receiver RF Section/Display, S/N: 3520A00248.
- **Spectrum Analyzer**, Advantest, Model R3271, S/N: 15050203, 100 Hz to 32 GHz)
- **Spectrum Analyzer**, Advantest, Model 3261A, SN 91720151, Input +25dBm max., 9KHz-2.6GHz, 50 Ohms, built-in Quasi-Peak Detector.
- **RF Preselector,** Advantest Model R3551, SN 92970002, 9KHz-1GHz, 50 Ohms input/output, input +25 dBm max, 30 dB gain.
- **Microwave Amplifier**, HP, Model 83017A, Frequency Range 0.5 to 22 GHz, 30dB gain nominal.
- **Active Loop Antenna**, Emco, Model 6502, 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, Sec. 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 measurements from 9 KHz to 150 KHz, set RBW = 200 Hz, VBW $\geq$ RBW, SWEEP=AUTO.
- For measurements from 150 KHz to 30 MHz, set RBW = 10 KHz, VBW $\geq$ RBW, SWEEP=AUTO.
- For measurements from 30 MHz to 1 GHz, set RBW = 100 KHz, VBW $\geq$ RBW, SWEEP=AUTO.
- For measurement above 1 GHz, set RBW = 1 MHz, VBW = 1 MHz, 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).

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.

TEST RESULTS: Conforms.

TEST PERSONNEL: Mr. Hung Trinh, RFI/EMI Technician

DATE: April 26, 2000

MEASUREMENT DATA

RADIATED EMISSIONS MEASUREMENTS @ 3 METERS

TEST CONFIGURATION

- For measurements from 9 KHz to 150 KHz, set RBW = 200 Hz, VBW ≥ RBW, SWEEP=AUTO.
- For measurements from 150 KHz to 30 MHz, set RBW = 10 KHz, VBW ≥ RBW, SWEEP=AUTO.
- For measurements from 30 MHz to 1 GHz, set RBW = 100 KHz, VBW ≥ RBW, SWEEP=AUTO.
- For measurement above 1 GHz, set RBW = 1 MHz, VBW = 1 MHz, SWEEP=AUTO.
- *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 readings added by the duty cycle correction factor. **DUTY CYCLE FACTOR = $20LOG_{10}(0.379)$ = -8.42 dB***

Note: The EUT was placed in 3 different orthogonal directions to search for maximum signal level.

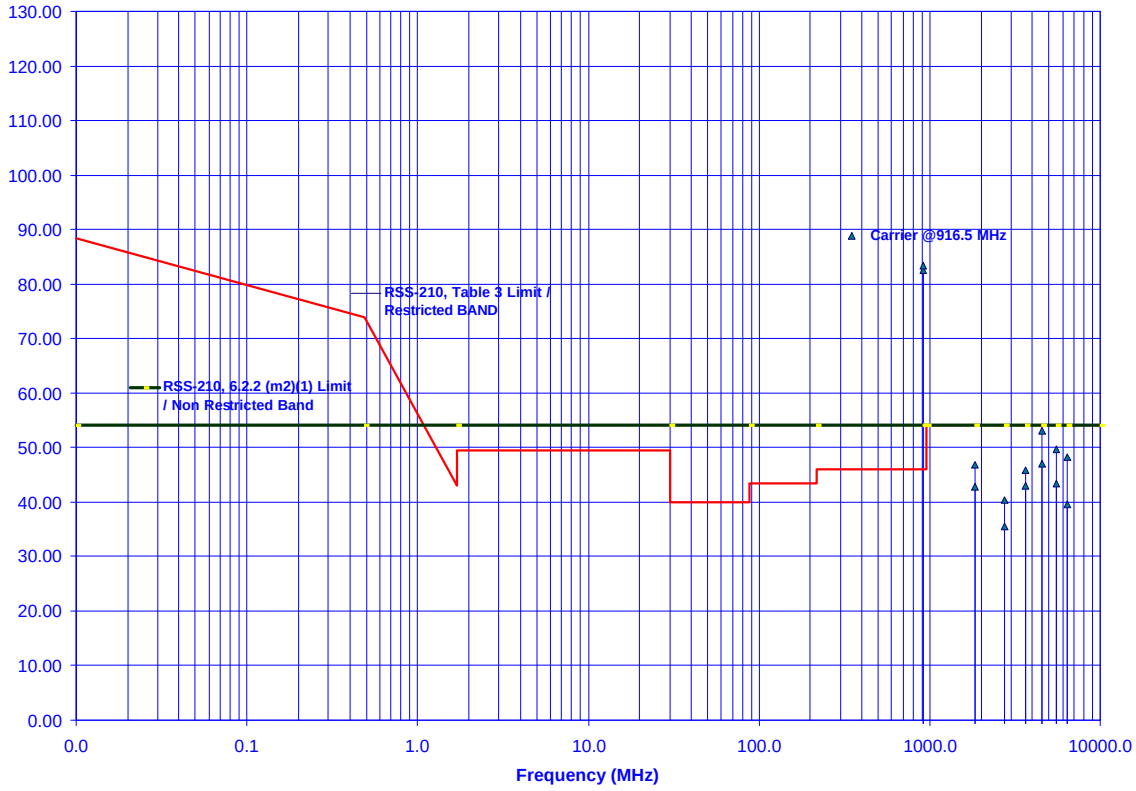
CHANNEL FREQUENCY TESTED: 916.5 MHz

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT Table 3 (dBuV/m)	LIMIT 6.2.2(m2)(1) (dBuV/m)	MARGIN (dB)	PASS/ FAIL
916.5	90.96	82.54	V	46.0	94.0	-11.5	PASS
916.5	91.74	83.32	H	46.0	94.0	-10.7	PASS
1833.0	55.16	46.74	V	54.0	54.0	-7.3	PASS
1833.0	51.25	42.83	H	54.0	54.0	-11.2	PASS
2749.5	48.76	40.34	V	54.0	54.0	-13.7	PASS*
2749.5	43.98	35.56	H	54.0	54.0	-18.4	PASS*
3666.0	54.15	45.73	V	54.0	54.0	-8.3	PASS*
3666.0	51.37	42.95	H	54.0	54.0	-11.1	PASS*
4582.5	61.51	53.09	V	54.0	54.0	-0.9	PASS*
4582.5	55.49	47.07	H	54.0	54.0	-6.9	PASS*
5499.0	58.13	49.71	V	54.0	54.0	-4.3	PASS
5499.0	51.79	43.37	H	54.0	54.0	-10.6	PASS
6415.5	56.74	48.32	V	54.0	54.0	-5.7	PASS
6415.5	48.00	39.58	H	54.0	54.0	-14.4	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 @ RSS-210, Table 2***

Transmitter Radiated Emissions Measurements at 3 Meter OFTS
Gemstar Communications Inc.
Activator, Model GSPS-ACT-02
TRANSMIT Freq.: 916.5 MHz



4.2. Industry Canada, RSS-210, Issue Draft 2, Section 7.3 & ICES-003, Issue 3 - Radiated Emission from the Digital Devices and Radio Receiver

PRODUCT NAME: **TDMA Activator, Model No.: GSPS-ACT-02**

INDUSTRY CANADA REQUIREMENT:

IC RSS-210, Issue Draft 2, Sub. B, Sec. 7.3 - Radio Receivers

The RF radiated emissions measured at 3 Metres distance shall not exceed the field strength below:

FREQUENCY (MHz)	FIELD STRENGTH LIMIT @ 3 Meters (dBuV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

IC ICES-003, Issue 3 – Class B Digital Apparatus

The RF radiated emissions measured at 3 Metres distance shall not exceed the field strength below:

FREQUENCY (MHz)	FIELD STRENGTH LIMIT @ 3 Meters (dBuV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 ^{o}C
- Relative humidity: 45 %

TEST EQUIPMENT:

- **EMI Receiver System/Spectrum Analyzer**, Hewlett Packard, Model 8546A, Input +25dBm max., 9KHz-5.6GHz, 50 Ohms, built-in Peak, Quasi-Peak & Average Detectors, Pre-Amplifier and Tracking Signal Generator. This System includes: (1) HP 85460A RF Filter Section, S/N: 3448A00236 and (2) HP 85462A Receiver RF Section/Display, S/N: 3520A00248.
- **Spectrum Analyzer**, Advantest, Model R3271, S/N: 15050203, 100 Hz to 32 GHz)
- **Spectrum Analyzer**, Advantest, Model 3261A, SN 91720151, Input +25dBm max., 9KHz-2.6GHz, 50 Ohms, built-in Quasi-Peak Detector.
- **RF Preselector,** Advantest Model R3551, SN 92970002, 9KHz-1GHz, 50 Ohms input/output, input +25 dBm max, 30 dB gain.
- **Microwave Amplifier**, HP, Model 8349A, SN: 2340A00206, Frequency Range 1 to 22 GHz, 30dB gain nominal.
- **Active Loop Antenna**, Emco, Model 6502, 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 C63.4-1992.

TEST RESULTS: Conforms.

TEST PERSONNEL: Mr. Hung Trinh, RFI/EMI Technician

DATE: April 26, 2000

MEASUREMENT DATA:

RADIATED EMISSIONS (@ 3 METERS)

REMARKS

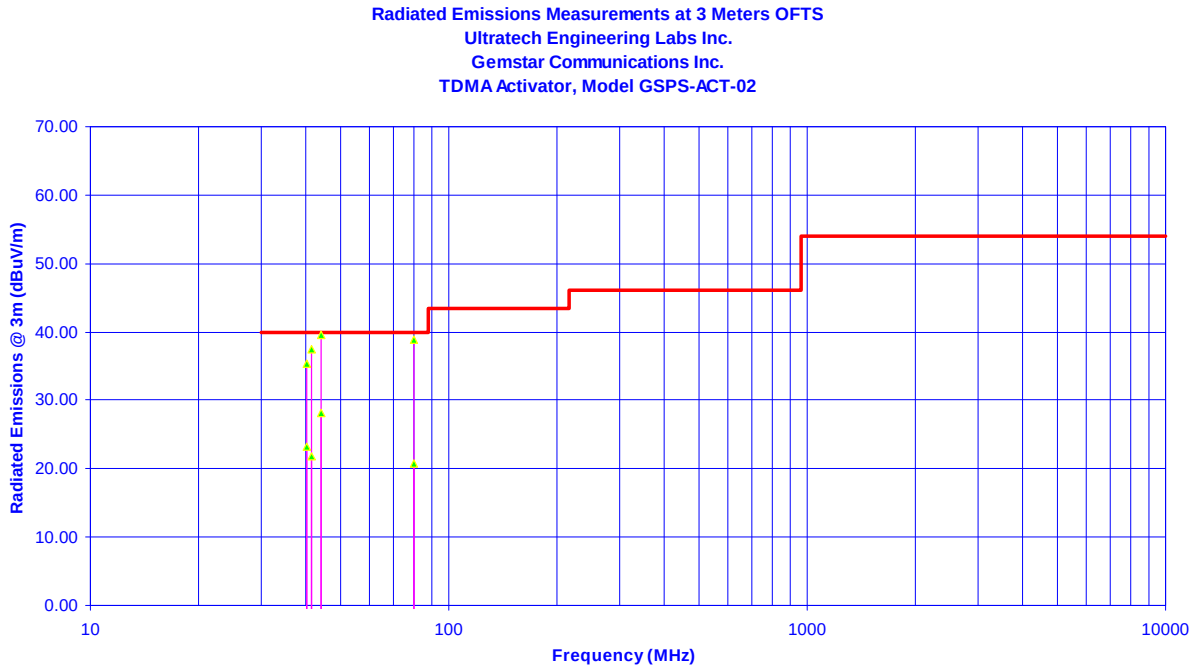
- ***All rf emissions from 30 to 1000 MHz were scanned, and all emission levels greater than 30 dBuV/m were recorded.***
- ***For Frequency range 30 - 1000 MHz***
  - ◊ ***Peak Detector, 100KHz RBW, 100KHz VBW***
  - ◊ ***CISPR QUASI-PEAK, 120KHz RBW, 1MHz VBW.***
- ***For Frequency > 1 Ghz***
  - ◊ ***Peak Detector, 1 MHz RBW, 1 MHz VBW***
  - ◊ ***AVERAGE: 1 MHz RBW, 10 Hz VBW.***

Radio Receiver

There was no significant signal RF emissions found from 30 to 5000 MHz.

Digital Apparatus

FREQUENCY (MHz)	RF LEVEL (dBuV/m)	DETECTOR USED (PEAK/QP)	ANTENNA PLANE (H/V)	LIMIT (dBuV/m)	MARGIN (dB)	PASS/ FAIL
40.09	35.36	PEAK	V	40.0	-4.6	PASS
40.09	23.24	PEAK	H	40.0	-16.8	PASS
41.43	37.43	PEAK	V	40.0	-2.6	PASS
41.43	21.78	PEAK	H	40.0	-18.2	PASS
44.11	39.61	PEAK	V	40.0	-0.4	PASS
44.11	28.13	PEAK	H	40.0	-11.9	PASS
80.21	38.81	PEAK	V	40.0	-1.2	PASS
80.21	20.71	PEAK	H	40.0	-19.3	PASS
The emissions were scanned from 30 to 1000 MHz and signal that come within 20 dB below the permissible limit were recorded						


Radiated Emissions Measurements at 3 Meters OFTS
Ultratech Engineering Labs Inc.
Gemstar Communications Inc.
TDMA Activator, Model GSPS-ACT-02
Radiated Emissions @ 3m (dBuV/m)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
10
100
1000
10000
Frequency (MHz)

4.3. Industry Canada, RSS-210, Issue 2, Sec. 6.6 & 7.4 - AC Wireline Conducted Emissions

NAME OF TEST: **Transmitter & Receiver - AC Wireline Conducted Emissions.**

CANADA LIMIT: **CANADA RSS-210, Issue Draft 2, Sec. 6.6 & 7.4**

The RF voltage conducted back onto the public utility lines shall not exceed 250 μV or 48.0 dBμV measured from 450 kHz to 30 MHz.

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 ^{o}C
- Relative humidity: 45 %

TEST EQUIPMENT:

- Advantest R3271 Spectrum Analyzer, Frequency Range: 100Hz-26.5GHz, with built-in Peak, Quasi-Peak and Average Detectors.
- HP 11947A Transient Limiter, HP, Model 11947A, Frequency Range: 9KHz-200MHz, Attenuation: 10dB HP.
- HP 7475 Plotter
- EMCO 3825/2 LISN, Frequency Range: 9KHz-200MHz
- RF Shielded Enclosure (12x16x12 feet)

METHOD OF MEASUREMENTS:

Refer to ANSI C63.4-1992.

TEST RESULTS: Conforms.

TEST PERSONNEL: Mr. Hung Trinh, RFI/EMI Technician

DATE: April 26, 2000

MEASUREMENT DATA

AC POWER-LINE CONDUCTED EMISSIONS

REMARKS

- ***All rf emissions from 450 KHz to 30 MHz were scanned, and eight highest emission levels were recorded. See attached plots.***
- ***P: Peak Detector, 10 KHz RBW, VBW ≥ RBW***
- ***Q: CISPR QUASI-PEAK, 9 KHz RBW, 1 MHz VBW.***
- ***QP/BB: for broadband emission (QP level - AVG level > 6 dB); the recorded level was QP level less 13 dB.***

There were no significant RF emissions found in the frequency range of 450 kHz to 30 MHz.

5. EXHIBIT 5 - GENERAL TEST PROCEDURES

5.1. AC Powerline Conducted Emissions Measurements - General Test Method

- AC Powerline Conducted Emissions were performed in the shielded room, 16'(L) by 12'(W) by 12'(H).
- Conducted power-line measurements were made over the frequency range from 450 KHz to 30 MHz to determine the line-to-ground radio noise voltage which was conducted from the EUT power-input terminals that were directly (or directly via separate transformers, power supplies) connected to a public power network.
- The EUT normally received power from another device that connects to the public utility ac power lines, measurements would be made on that device with the EUT in operation to ensure that the device continues to comply with the appropriate limits while providing the EUT with power.
- The EUT was operated only from internal or dedicated batteries, with no provisions for connection to the public utility ac power lines, ac power-line conducted measurements were not required.
- Table-top devices were placed on a platform of nominal size 1 m by 1.5m raised 80 cm above the conducting ground plane.
- The EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the power source. All unused 50-Ohm connectors of the LISN was terminated in 50-ohm when not connected to the measuring instruments.
- The line cord of the EUT connected to one LISN which was connected to the measuring instrument. Those power cords for the units of devices not under measurement were connected to a separate multiple ac outlets. Drawings and photographs of typically conducted emission test setups were shown in the Test Report. Each current-carrying conductor of the EUT shall be individually tested.
- The EUT was normally operated with a ground (safety) connection, the EUT was connected to the ground at the LISN through a conductor provided in the lead from the ac power mains to the LISN.
- The excess length of the power cord was folded back and forth in an 8-shape on a wooden strip with a vertical prong located on the top of the LISN case.
- The EUT was set-up in its typical configuration and operated in its various modes as described in 3.2 of the test report.
- A preliminary scan was made by using spectrum analyzer system with the detector function set to PEAK mode (10 KHz RBW, VBW $\geq$ RBW), frequency span 450KHz-30MHz.
- The maximum conducted 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 EUT azimuth.

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

  Step3. The effects of various modes of operation is examined. This is done by varying equipment operation modes as step 2 is being performed.

  Step4. After completing step 1 through 3, record EUT and peripheral device configuration, mode of operation, cable configuration, signal levels and frequencies for final test.

- Each highest signal level at the maximized test configuration was zoomed in a small frequency span on the spectrum analyzer's display (the manipulation of cables and peripheral devices and EUT operation modes might have to be repeated to obtain the highest signal level with the spectrum analyzer set to PEAK detector mode 10 KHz RBW and VBW ≥ RBW). The spectrum analyzer was then set to CISPR QUASI-PEAK detector mode (9 KHz RBW, 1 MHz VBW) and the final highest RF signal level and frequency was record.

- ***Broad-band ac powerline conducted emissions***:- If the EUT exhibits ac powerline conducted emissions that exceed the limit with the instrument set to the quasi-peak mode, then measurements should be made in the average mode. If the amplitude measured in the quasi-peak mode is at least 6 dB higher than the amplitude measured in the average mode, the level measured in quasi peak mode may be reduced by 13 dB before comparing it to the limit.

5.2. 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. Calibrated Advantest spectrum analyzer and pre-selector. 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 VBW ≥ RBW for frequency below 30 MHz, 100 KHz RBW and VBW ≥ 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 polarity of the antenna and repeat Step 2 through 4. Compare the resulting suspected highest amplitude signal with that found for the other polarity. 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:

$$\mathbf{FS = RA + AF + CF - AG}$$

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 and cable factor of 1.0 dB are added, and the amplifier gain of 30 dB is subtracted. The actual field strength will be:.

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

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. IC Labeling

Refer to the attached label

6.2. Photographs of Equipment under Test

Refer to the attached photographs

6.3. System Block Diagram(s)

Refer to the attached block diagram

6.4. Schematic Diagrams(s)

Refer to the attached schematics

6.5. User's Manual

Refer to the attached manual