



Flom Test Labs
EMI, EMC, RF Testing Experts Since 1963

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Date of Report: January 17, 2006
Date of Submission: February 9, 2006

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Telex Communications, Inc.
Equipment: X0-AP
FCC ID: B5DM525
FCC Rules: 15.247

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

Filing fees are attached.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,

David E. Lee, FCC Compliance Manager

enclosure(s)
cc: Applicant
DEL/del



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Transmitter Certification

of

FCC ID: B5DM525
Model: X0-AP

to

Federal Communications Commission

Rule Part(s) 15.247

Date Of Report: January 17, 2006

On the Behalf of the Applicant:

Telex Communications, Inc.

At the Request of:

P.O. 336057

Telex Communications, Inc.
8601 E. Cornhusker Highway
P.O. Box 5579
Lincoln, NE 68505-5579

Attention of:

Charles E. Conner, Project Engineer
(402) 467-5321; FAX: -3279
E-mail: charlie.conner@us.telex.com
Jim Andersen
Email: jim.andersen@us.telex.com

Supervised By:

David E. Lee, FCC Compliance Manager

List Of Exhibits
(FCC **Certification** (Transmitters) - Revised 9/28/98)

Applicant: Telex Communications, Inc.

FCC ID: B5DM525

By Applicant:

1. Letter Of Authorization
2. Identification Drawings
 - Id Label
 - Location Info
 - Attestation Statement
 - Location of Compliance Statement
3. Documentation: 2.1033(B)
 - (3) User Manual
 - (4) Operational Description
 - (5) Block Diagram
 - (5) Schematic Diagram
 - (7) External Photographs
 - Internal Photographs
 - Parts List
 - Active Devices

By M.F.A. Inc.,

- A. Testimonial & Statement of Certification

The applicant has been cautioned as to the following:

15.21 Information to User.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

a) **Test Report**

b) Laboratory: M. Flom Associates, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044) Chandler, AZ 85225

c) Report Number: d0610021

d) Client: Telex Communications, Inc.
8601 E. Cornhusker Highway
P.O. Box 5579
Lincoln, NE 68505-5579

e) Identification: X0-AP
FCC ID: B5DM525
Description: 2.4MHz Access Point

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: January 17, 2006
EUT Received: January 10, 2006

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:



David E. Lee, FCC Compliance Manager

n) Results: The results presented in this report relate only to the item tested.

o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

List Of General Information Required For Certification

In Accordance with FCC Rules and Regulations,
Volume II, Part 2 and to 15.247

Sub-Part 2.1033

(c)(1): **Name and Address of Applicant:**

Telex Communications, Inc.
8601 E. Cornhusker Highway
P.O. Box 5579
Lincoln, NE 68505-5579

Manufacturer:

Applicant

(c)(2): **FCC ID:** B5DM525

Model Number: X0-AP

(c)(3): **Instruction Manual(s):**

Please See Attached Exhibits

(c)(4): **Type of Emission:** DSSS

(c)(5): **FREQUENCY RANGE, MHz:** 2412 to 2462 (11 Channels)

(c)(6): **Power Rating, W:** 0.200 (Conducted)
_____ Switchable _____ Variable X N/A

(c)(7): **Maximum Power Rating, W:** 1.0 @ 3m

15.203: Antenna Requirement:

- _____ The antenna is permanently attached to the EUT
 X The antenna uses a unique coupling
_____ The EUT must be professionally installed
_____ The antenna requirement does not apply

Subpart 2.1033 (continued)

(c)(8): Voltages & Currents in All Elements in Final RF Stage, Including Final Transistor or Solid State Device:

Collector Current, A	=	.1
Collector Voltage, Vdc	=	3.3
Supply Voltage, Vdc	=	12

(c)(10): **Circuit Diagram/Circuit Description:**

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please See Attached Exhibits

(c)(11): **Label Information:**

Please See Attached Exhibits

(c)(12): **Photographs:**

Please See Attached Exhibits

(c)(13): **Digital Modulation Description:**

☐ Attached Exhibits
☒ N/A

(c)(14): **Test And Measurement Data:**

Follows

Sub-part
2.1033(b):

Test And Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.1031, 2.1033, 2.1035, 2.1041, 2.1043, 2.1045, and the following individual Parts:

_____	15.209	Radiated emission limits; general requirements
_____	15.211	Tunnel radio systems
_____	15.213	Cable locating equipment
_____	15.214	Cordless telephones
_____	15.217	Operation in the band 160-190 kHz
_____	15.219	Operation in the band 510-1705 kHz
_____	15.221	Operation in the band 525-1705 kHz (leaky coax)
_____	15.223	Operation in the band 1.705-10 MHz
_____	15.225	Operation in the band 13.553-13.567 MHz
_____	15.227	Operation in the band 26-27.28 MHz (remote control)
_____	15.229	Operation in the band 40.66-40.70 MHz
_____	15.231	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz
_____	15.233	Operation within the bands 43.71-44.49, 46.60-46.98 MHz 48.75-49.51 MHz and 49.66-50.0 MHz
_____	15.235	Operation within the band 49.82-49.90 MHz
_____	15.237	Operation within the bands 72.0-73.0 MHz, 74.6-74.8 MHz and 75.2-76.0 MHz (auditory assistance)
_____	15.239	Operation in band 88-108 MHz
_____	15.241	Operation in the band 174-216 MHz (biomedical)
_____	15.243	Operation in the band 890-940 MHz (materials)
_____	15.245	Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz, and 24075-24175 MHz (filed disturbance sensors)
X _____	15.247	Operation within bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz (spread spectrum)
_____	15.249	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz
_____	15.251	Operation within the bands 2.9-3.26 GHz, 3.267-3.332 GHz, 3.339-3.3458 GHz, and 3.358-3.6 GHz (vehicle identification systems)
_____	15.321	Specific requirements for asynchronous devices operating in the 1910-1920 MHz and 2390-2400 MHz bands (Unlicensed PCS)
_____	15.323	Specific requirements for isochronous devices operating in the 1920-1930 MHz sub-band (Unlicensed PCS)

Standard Test Conditions And Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSIC63.4-1992/2003, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst-case measurements.



A2LA

"A2LA has accredited M. Flom Associates, Inc. Chandler, AZ for technical competence in the field of Electrical Testing. The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 – 1999 'General Requirements for the Competence of Testing and Calibration Laboratories' and any additional program requirements in the identified field of testing."

Certificate Number: **2152-01**

Name of Test: Carrier Output Power (Conducted)

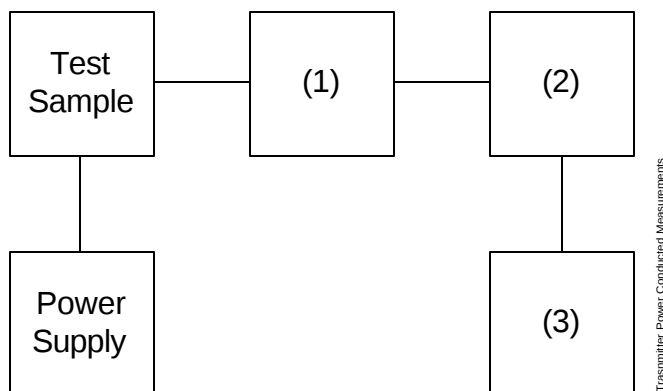
Specification: 47 CFR 2.1046(a)

Measurement Procedure

A) The EUT was connected to a resistive coaxial attenuator of normal load impedance, and the unmodulated output power was measured by means of an RF Power Meter.

B) Measurement accuracy is $\pm 3\%$.

Transmitter Test Set-Up: RF Power Output



	Asset	Description	s/n	Cycle	Last Cal
(1)	Coaxial Attenuator				
X	i00231/2	PASTERNAK PE7021-30 (30 dB)	231 or 232	NCR	
	i00122/3	NARDA 766 (10 dB)	7802 or 7802A	NCR	
(2)	Power Meters				
	i00020	HP 8901A Power Mode	2105A01087	12 mo.	Apr-05
	i00020	HP 8901A Frequency Mode	2105A01087	12 mo.	Apr-05
(3)	Spectrum Analyzer				
X	i00029	HP 8563E	3213A00104	12 mo.	May-05
X	i00033	HP 85462A	3625A00357	12 mo.	Sep-05

Name of Test: Carrier Output Power (Conducted)

Measurement Results
(Worst case)

Frequency of Carrier, MHz = 2412, 2437, 2462
 Ambient Temperature = 23°C ± 3°C

Power Setting	RF Power, dBm	RF Power, Watts
High	23.0	0.200

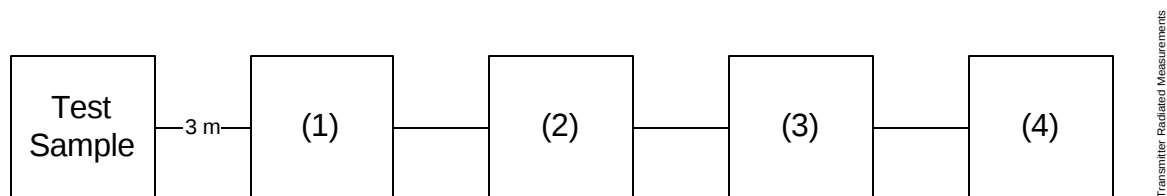


Performed by: Fred Chastain, Test Technician

Name of Test: EIRP Carrier Power (Radiated)

Specification: ANSI C63.4:2003

Radiated Test Setup



Test Equipment

Asset	Description	s/n	Cycle	Last Cal
(1) Transducer				
i00088	EMCO 3109-B 25MHz-300MHz	2336	24 mo.	Sep-05
X i00089	Apriel 2001 200MHz-1GHz	001500	24 mo.	Sep-05
X i00103	EMCO 3115 1GHz-18GHz	9208-3925	24 mo.	Sep-05
(3) Amplifier				
X i00028	HP 8449A	2749A00121	12 mo.	May-05
(4) Spectrum Analyzer				
X i00029	HP 8563E	3213A00104	12 mo.	May-05
X i00033	HP 85462A	3625A00357	12 mo.	Sep-05

Name of Test: EIRP Carrier Power (Radiated)

Measurement Results

Antenna Gain, dBi 7.0dBi Omni-Directional
 Peak Output Power, Watts 0.977W, Worst Case For All Channels

g0610006: 2006-Jan-18 Wed 09:15:00
 State: 2:High Power

Ambient Temperature: 23°C ± 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	CF, dB	Path Loss, dBm	EIRP, dBm	EIRP, Watts
2412.000000	2412.000000	33.08	+2.8	29.6	0.910
2437.000000	2436.880000	33.17	+2.6	29.9	0.977
2462.000000	2462.130000	33.27	+2.5	29.8	0.955

Antenna Gain, dBi 11.0dBi Directional Patch
 Peak Output Power, Watts 2.399W, Worst Case For All Channels

g0610007: 2006-Jan-18 Wed 09:54:00
 State: 2:High Power

Ambient Temperature: 23°C ± 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	CF, dB	Path Loss, dBm	EIRP, dBm	EIRP, Watts
2412.000000	2412.000000	33.08	+2.8	33.8	2.399
2437.000000	2436.880000	33.17	+2.6	33.6	2.291
2462.000000	2462.130000	33.27	+2.5	33.3	2.138



Performed by:

Fred Chastain, Test Technician

Name of Test: Spurious Radiation

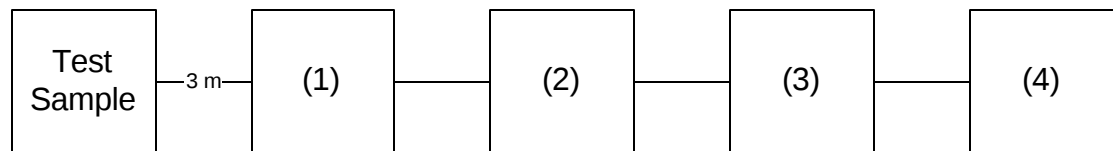


Name of Test: Spurious Radiation

Specification: 47 CFR 2.1053(a)

Guide: ANSI C63.4:2003

Radiated Test Setup



Transmitter Radiated Measurements

Test Equipment:

	Asset	Description	s/n	Cycle	Last Cal
	Per ANSI C63.4-1992/2000 Draft, 10.1.4				
	(1) Transducer				
X	i00088	EMCO 3109-B 25MHz-300MHz	2336	24 mo.	Sep-05
	i00065	EMCO 3301-B Active Monopole	2635	24 mo.	Sep-05
X	i00089	Apriel 2001 200MHz-1GHz	001500	24 mo.	Sep-05
X	i00103	EMCO 3115 1GHz-18GHz	9208-3925	24 mo.	Sep-05
	(3) Amplifier				
X	i00028	HP 8449A	2749A00121	12 mo.	May-05
	(4) Spectrum Analyzer				
X	i00029	HP 8563E	3213A00104	12 mo.	May-05
X	i00033	HP 85462A	3625A00357	12 mo.	Sep-05
	i00048	HP 8566B	2511AD1467	12 mo.	Jun-05

Name of Test: Field Strength of Spurious Radiation

State: 2:High Power g0590017: 2005-Sep-02 Fri 10:53:00

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV	CF, dB	V/H	uV/m @ 3m	ERP, dBm	Margin, dB
2479.000000	4958.314544	-0.33	39.25	H	88.31	-58.5	-15.1
2479.000000	4958.349352	-3.00	39.25	V	64.94	-61.1	-17.8
2479.000000	7437.370750	6.57	42.38	V	280.22	-48.4	-5.1
2479.000000	7437.467031	4.93	42.38	H	232.01	-50.1	-6.7
2479.000000	9916.463013	2.20	46.69	H	278.29	-48.5	-5.1
2479.000000	9916.466729	2.03	46.69	V	272.90	-48.7	-5.3
2479.000000	12395.614095	1.03	47.39	H	263.63	-49.0	-5.6
2479.000000	12395.618111	1.53	47.39	V	279.25	-48.5	-5.1
2479.000000	14874.309927	-1.83	50.47	H	270.40	-48.7	-5.4
2479.000000	14874.351278	-1.50	50.47	V	280.87	-48.4	-5.0

State: 2:High Power g0590018: 2005-Sep-02 Fri 11:10:00

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV	CF, dB	V/H	uV/m @ 3m	ERP, dBm	Margin, dB
2445.000000	4890.094500	6.35	39.27	V	190.99	-51.8	-8.4
2445.000000	4890.094500	6.39	39.27	H	191.87	-51.7	-8.3
2445.000000	7335.401027	-2.50	41.89	V	93.22	-58.0	-14.6
2445.000000	7335.408343	-3.00	41.89	H	88.00	-58.5	-15.1
2445.000000	9780.437509	-2.67	46.87	H	162.18	-53.2	-9.8
2445.000000	9780.449743	-1.17	46.87	V	192.75	-51.7	-8.3
2445.000000	12225.379043	-1.50	48.94	H	235.50	-49.9	-6.6
2445.000000	12225.383693	-2.83	48.94	V	202.07	-51.3	-7.9
2445.000000	14670.392843	-2.00	48.04	V	200.45	-51.3	-8.0
2445.000000	14670.413209	-3.00	48.04	H	178.65	-52.3	-9.0

State: 2:High Power g0590019: 2005-Sep-02 Fri 11:21:00

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV	CF, dB	V/H	uV/m @ 3m	ERP, dBm	Margin, dB
2402.000000	4804.090000	5.97	39.30	V	183.44	-52.1	-8.7
2402.000000	4804.090000	6.06	39.30	H	185.35	-52.0	-8.6
2402.000000	7206.319444	-2.33	41.27	V	88.51	-58.4	-15.1
2402.000000	7206.370778	-2.50	41.27	H	86.80	-58.6	-15.2
2402.000000	9608.324444	-2.67	47.11	V	166.72	-52.9	-9.6
2402.000000	9608.346344	-0.33	47.11	H	218.27	-50.6	-7.2
2402.000000	12010.340744	-3.00	50.95	V	249.75	-49.4	-6.1
2402.000000	12010.361627	-1.83	50.95	H	285.76	-48.3	-4.9
2402.000000	14412.292161	-3.00	46.57	V	150.83	-53.8	-10.4
2402.000000	14412.316427	-1.67	46.57	H	175.79	-52.5	-9.1



Performed by:

Fred Chastain, Test Technician

Name of Test: Radiated Spurious Emissions (Non-Harmonic)

Guide: ANSI C63.4:2003

Test Equipment: As per previous page

15.249(c):

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emissions limits in § 15.209, whichever is the lesser attenuation.

Measurement Results: Radiated Spurious Emissions (Non-Harmonic)

Frequency of Carrier, MHz = 2445.000000

Spectrum Searched = 0 to 10 x F_C

Name Of Test: Radiated Spurious Emissions

g0590020: 2005-Sep-02 Fri 11:38:00

Frequency Emission, MHz	Meter, dBuV	@ m	C.F., dB	Limit, uV/m	uV/m	@ m
35.035000	25.02	3	11.38	100.0	66.07	3
45.580000	19.55	3	12.36	100.0	39.40	3
55.730000	12.78	3	10.81	100.0	15.12	3
115.040000	14.87	3	10.88	150.0	19.39	3
135.310000	11.87	3	11.85	150.0	15.35	3
146.510000	10.68	3	12.14	150.0	13.84	3
176.510000	9.16	3	12.20	150.0	11.69	3
176.860000	13.40	3	12.24	150.0	19.14	3
214.110000	12.60	3	14.72	150.0	23.23	3
216.860000	9.40	3	14.89	200.0	16.39	3
235.860000	16.11	3	15.91	200.0	39.90	3
248.310000	15.86	3	16.57	200.0	41.83	3
265.860000	12.35	3	19.78	200.0	40.41	3
266.580000	9.55	3	19.92	200.0	29.75	3
283.230000	12.40	3	22.96	200.0	58.61	3
293.880000	12.27	3	24.85	200.0	71.78	3
295.510000	12.58	3	25.14	200.0	76.91	3
303.050000	14.22	3	15.35	200.0	30.10	3
330.350000	8.69	3	15.95	200.0	17.06	3
354.350000	10.01	3	16.52	200.0	21.21	3
388.950000	14.65	3	17.26	200.0	39.40	3
390.200000	13.15	3	17.30	200.0	33.30	3
434.130000	14.34	3	18.07	200.0	41.73	3



Performed by:

Fred Chastain, Test Technician

Name Of Test: Radiated Spurious Emissions (Cont)

g0590020: 2005-Sep-02 Fri 11:38:00

Frequency Emission, MHz	Meter, dBuV	@ m	C.F., dB	Limit, uV/m	uV/m	@ m
440.200000	12.13	3	18.17	200.0	32.73	3
441.750000	13.47	3	18.19	200.0	38.28	3
500.200000	14.38	3	18.99	200.0	46.61	3
612.850000	10.61	3	25.01	200.0	60.39	3
665.050000	10.21	3	25.81	200.0	63.24	3
672.850000	10.84	3	25.94	200.0	69.02	3
714.000000	12.09	3	26.23	200.0	82.41	3
744.130000	13.81	3	25.85	200.0	96.16	3
761.200000	11.58	3	25.63	200.0	72.53	3
762.500000	12.63	3	25.61	200.0	81.66	3
780.130000	13.28	3	25.37	200.0	85.61	3
803.000000	12.05	3	25.14	200.0	72.36	3
833.630000	11.50	3	25.46	200.0	70.47	3
902.380000	15.92	3	26.22	200.0	127.94	3
906.130000	16.11	3	26.35	200.0	132.74	3

All other emissions in the required measurement range were more that 20 dB below the required limits.



Performed by:

Fred Chastain, Test Technician

Name of Test: Emission Masks (Occupied Bandwidth)
Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.11
Test Equipment: As per previous page

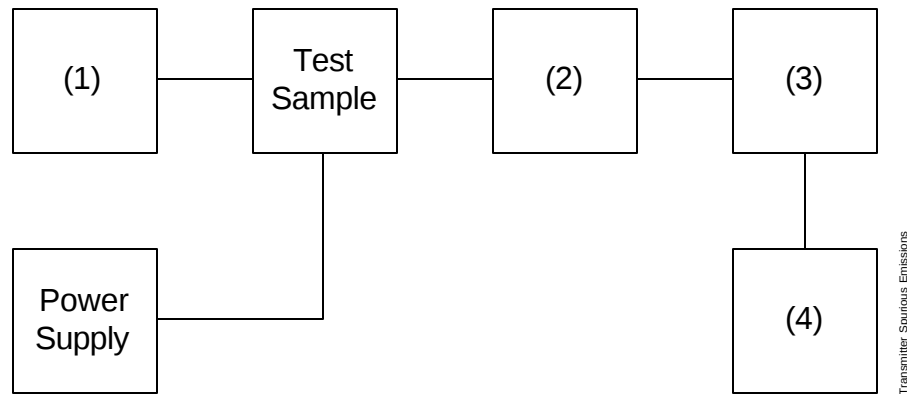
Measurement Procedure

1. The EUT and test equipment were set up as shown on the following page, with the Spectrum Analyzer connected.
2. For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for ± 2.5 kHz deviation (or 50% modulation). With level constant, the signal level was increased 16 dB.
3. For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.
4. The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.
5. Measurement Results: Attached

Transmitter Spurious Emission

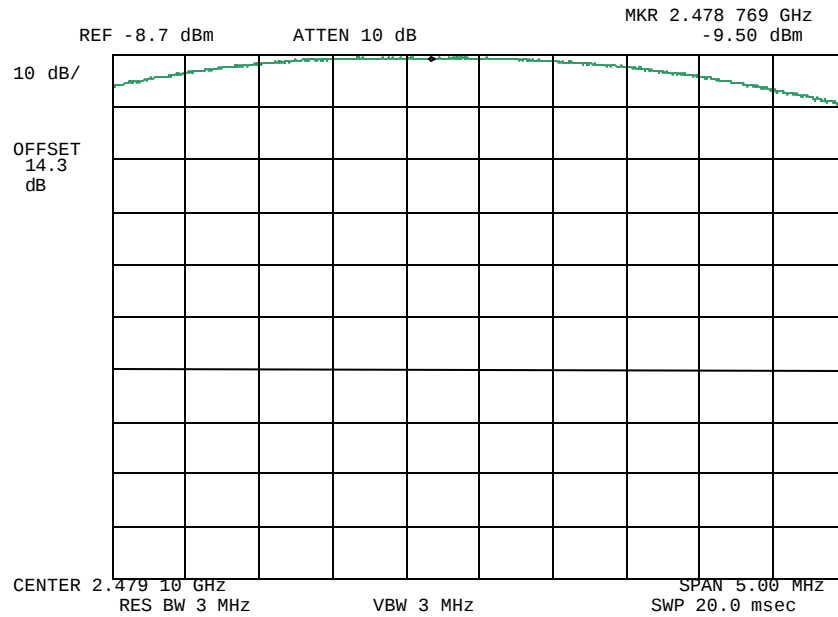
Test A. Occupied Bandwidth (In-Band Spurious)

Test B. Out-of-Band Spurious



Asset (as applicable)	Description	s/n	Cycle	Last Cal
(1) Audio Oscillator/Generator				
X i00017	HP 8903A Modulation Meter	2216A01753	12 mo.	Apr-05
(2) Coaxial Attenuator				
X i00231/2	PASTERNAK PE7021-30 (30 dB)	231 or 232	NCR	
i00123	NARDA 766 (10 dB)	7802A	NCR	
(3) Interface				
X i00021	HP 8954A Transceiver Interface	2146A00159	NCR	
(4) Spectrum Analyzer				
X i00048	HP 8566B Spectrum Analyzer	2511A01467	12 mo.	Jul-05
i00029	HP 8563E Spectrum Analyzer	3213A00104	12 mo.	May-05

Name of Test: Emission Masks (Occupied Bandwidth)
g0590025: 2005-Sep-12 Mon 09:05:00
State: 0:General



Power:
Modulation:

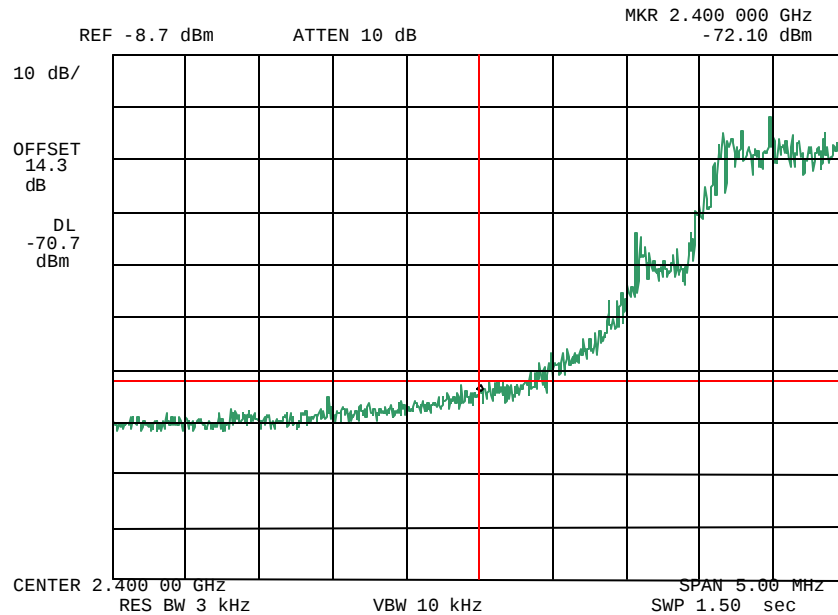
LOOSE COUPLED
MAX BW POWER

Fred Chastain

Performed by:

Fred Chastain, Test Technician

Name of Test: Emission Masks (Occupied Bandwidth)
g0590026: 2005-Sep-12 Mon 09:12:00
State: 0:General



Power:
Modulation:

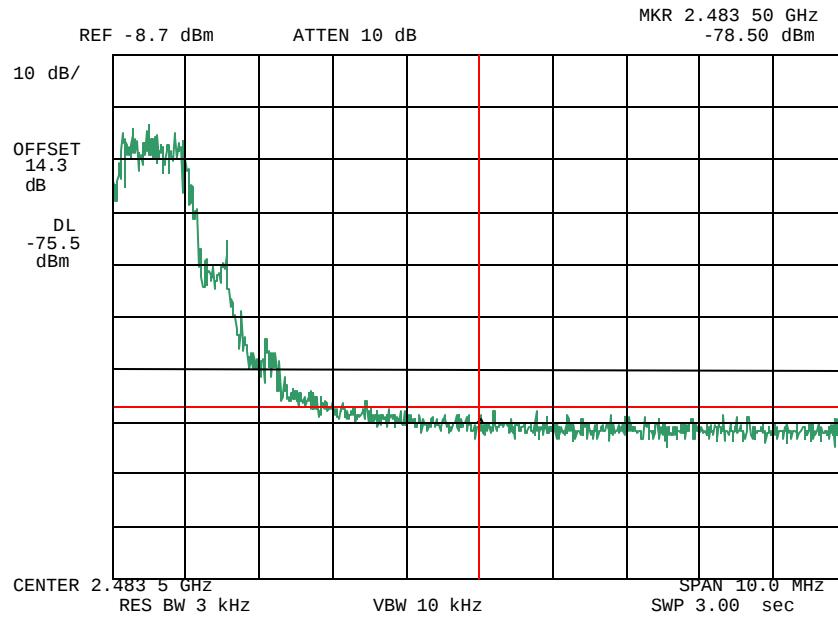
LOOSE COUPLED
LOW BAND EDGE (-70.7dBc below
2400.0MHz)
Limit -50dBc or 15.209

Fred Chastain

Performed by:

Fred Chastain, Test Technician

Name of Test: Emission Masks (Occupied Bandwidth)
g0590027: 2005-Sep-12 Mon 09:14:00
State: 0:General



Power:
Modulation:

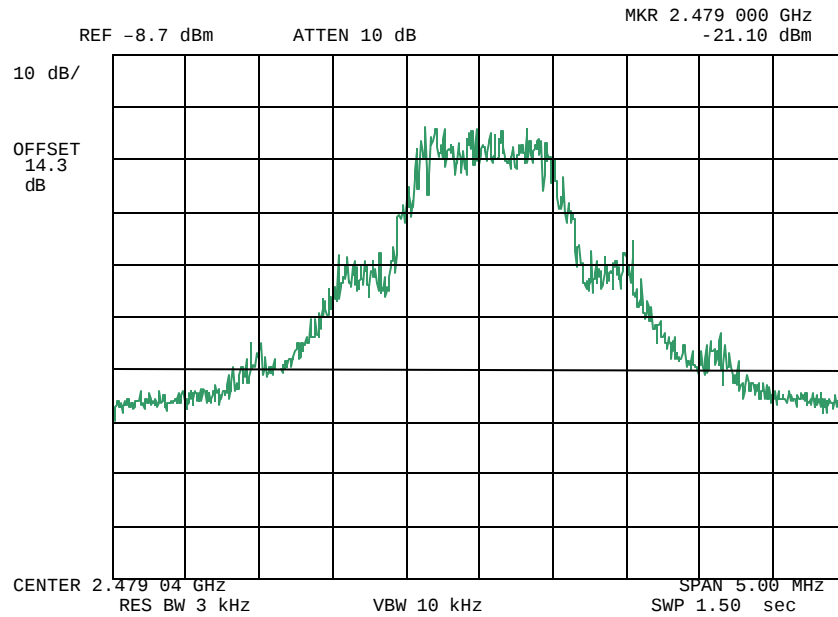
LOOSE COUPLED
HI BAND EDGE (-75.5dBc above 2483.5MHz)
Limit -50dBc or 15.209

Fred Chastain

Performed by:

Fred Chastain, Test Technician

Name of Test: Emission Masks (Occupied Bandwidth)
g0590028: 2005-Sep-12 Mon 09:16:00
State: 0:General



Power:
Modulation:

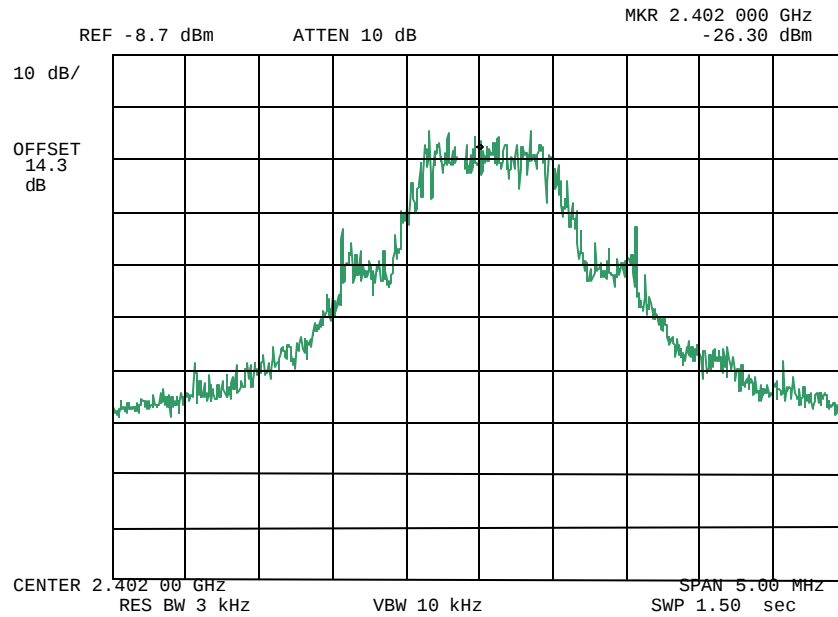
LOOSE COUPLED
HI CHANNEL

Fred Chastain

Performed by:

Fred Chastain, Test Technician

Name of Test: Emission Masks (Occupied Bandwidth)
g0590029: 2005-Sep-12 Mon 09:17:00
State: 0:General



Power:
Modulation:

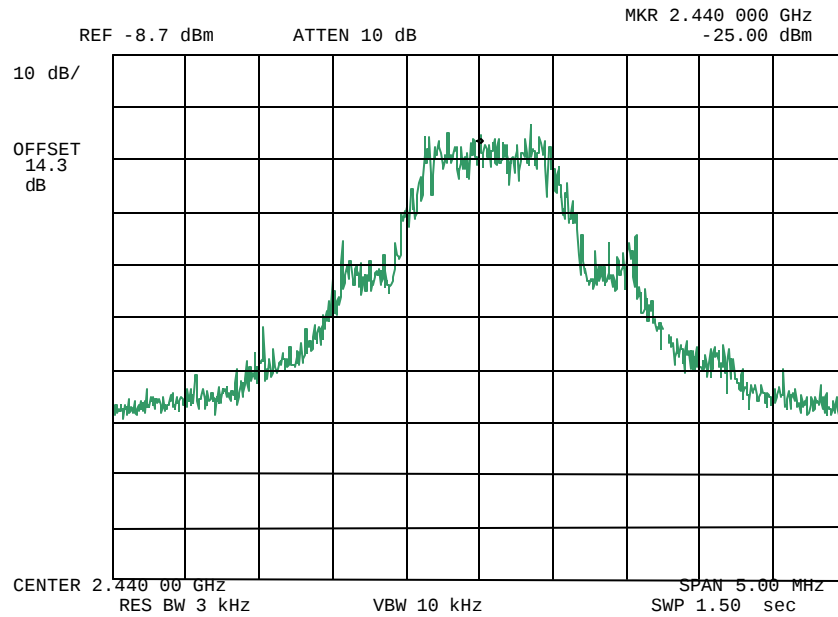
LOOSE COUPLED
LO CHANNEL

Fred Chastain

Performed by:

Fred Chastain, Test Technician

Name of Test: Emission Masks (Occupied Bandwidth)
g0590030: 2005-Sep-12 Mon 09:19:00
State: 0:General



Power:
Modulation:

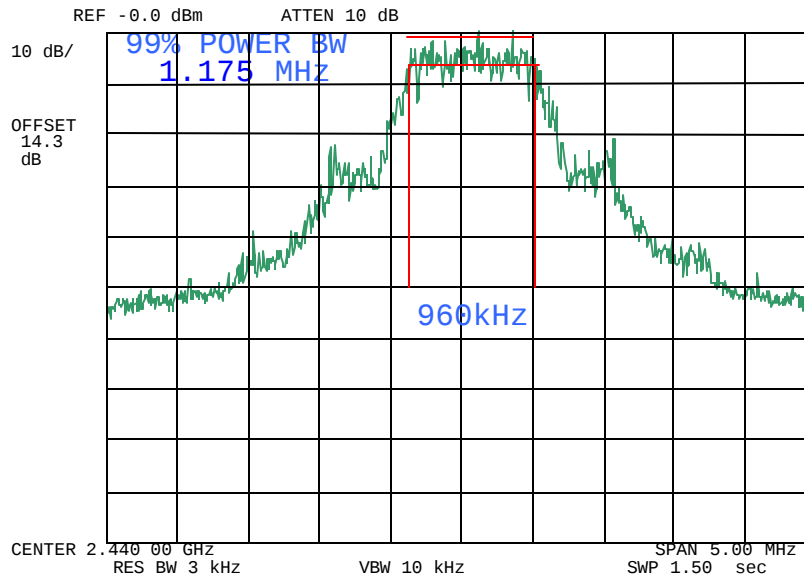
LOOSE COUPLED
MID CHANNEL

Fred Chastain

Performed by:

Fred Chastain, Test Technician

Name of Test: Emission Masks (Occupied Bandwidth)
g0590031: 2005-Sep-12 Mon 09:20:00
State: 0:General



Power:
Modulation:

LOOSE COUPLED
MID CHANNEL
6dB BW 960kHz (Marker Delta Method)
99% Power BW 1.175MHz

Fred Chastain

Performed by:

Fred Chastain, Test Technician

Name of Test: Spread Spectrum Technology
Direct Sequence Systems

15.247(d) Transmitter Power Density

Limit: The transmitter power density peak over any 1 second interval shall not be greater than 8dBm in any 3 kHz Bandwidth within these bands.

Results:

Frequency	Measured dBm @ 1Hz	Calculated dBm @ 3kHz	Margin dBm
2412.000	-32.90	1.90	-6.10
2440.000	-32.30	2.50	-5.10
2462.000	-31.40	3.40	-4.60

Power Spectral Density per 3-kHz bandwidth = Power Spectral Density per 1-Hz bandwidth + Bandwidth Correction Factor.
 Bandwidth Correction Factor = $10 \cdot \log(3 \text{ kHz} / 1 \text{ Hz}) = 34.8 \text{ dB}$

15.247(e) Processing Gain

Limit: The processing gain shall be = 10 dB

Results: See Applicant's statement



Performed by:

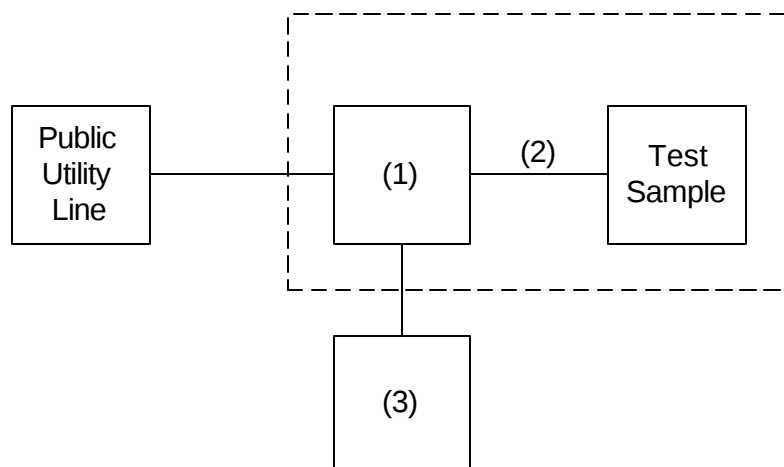
Fred Chastain, Test Technician

Name of Test: A/C Powerline Conducted Emissions
Specification: FCC: 47 CFR 15.27
Guide: IEEE Standard 213
Test Conditions: S. T. & H.
Test Equipment: As per attached page

Measurement Procedure

1. A test sample was connected to the Public Utility lines through a LISN (50 μ H).
2. A reference level of 250 μ V was set on the Spectrum Analyzer. The spectrum was searched over the range of 150 kHz to 30 MHz.
3. All other emissions were 20 dB or more below limit.
4. ☐ The test sample used a charger.
☒ The test sample does not use a charger.

AC Powerline Conducted Measurements



Asset	Description	s/n	Cycle	Last Cal
(1) Line Impedance Stabilization Network				
X i00244	Fischer 50-20-2-01	2047	NCR	
(2) Screen Room				
X i00170	Lindgren LG170	4999	NCR	
(3) Spectrum Analyzer				
X i00033	HP 85462A	3625A00357	12 mo.	Sep-05
i00048	HP 8566B	2511AD1467	12 mo.	May-05

Name of Test: A/C Powerline Conducted Emissions



Results:
A/C Powerline Conducted Emissions

g0590021: 2005-Sep-07 Wed 14:41:00

State: 0:General

Frequency Tuned, MHz	Frequency Emission, MHz	Level, dBuV	C.F., dB	μV/m
0.000000	0.203400	50.90	-8.57	130.77
0.000000	0.344300	43.46	-8.90	53.46
0.000000	0.409900	43.18	-8.90	51.76
0.000000	0.546300	38.18	-8.89	29.14
0.000000	0.615000	39.21	-8.90	32.77
0.000000	0.752500	41.14	-8.91	40.88
0.000000	0.822500	38.85	-8.91	31.41
0.000000	0.965000	37.11	-8.91	25.70
0.000000	1.300000	42.03	-8.91	45.29
0.000000	2.480000	43.09	-8.90	51.23
0.000000	3.160000	42.52	-8.88	48.08
0.000000	4.620000	41.31	-8.82	42.12
0.000000	5.450000	43.53	-8.78	54.64
0.000000	10.050000	36.83	-8.57	25.88
0.000000	10.880000	32.05	-8.53	15.00
0.000000	14.780000	37.82	-8.33	29.82
0.000000	15.640000	39.17	-8.30	34.95
0.000000	21.600000	29.65	-7.71	12.50
0.000000	23.960000	27.08	-7.92	9.08
0.000000	28.010000	21.80	-7.84	4.99
0.000000	29.510000	17.86	-7.81	3.18



Performed by:

Fred Chastain, Test Technician

Results:
A/C Powerline Conducted Emissions

g0590022: 2005-Sep-07 Wed 14:57:00

State: 0:General

Frequency Tuned, MHz	Frequency Emission, MHz	Level, dBuV	C.F., dB	μV/m
0.000000	0.204300	51.26	-8.55	136.62
0.000000	0.343400	39.99	-8.90	35.85
0.000000	0.413400	40.98	-8.90	40.18
0.000000	0.548800	35.66	-8.91	21.75
0.000000	0.616300	37.93	-8.93	28.18
0.000000	0.755000	33.70	-8.96	17.26
0.000000	0.825000	33.12	-8.96	16.14
0.000000	1.230000	35.02	-8.99	20.02
0.000000	1.780000	37.70	-8.99	27.26
0.000000	2.760000	40.77	-8.93	39.08
0.000000	3.660000	43.65	-8.87	54.83
0.000000	4.550000	43.21	-8.81	52.48
0.000000	5.180000	41.83	-8.77	44.98
0.000000	9.300000	33.52	-8.55	17.72
0.000000	11.850000	31.42	-8.43	14.11
0.000000	14.050000	36.16	-8.33	24.63
0.000000	15.340000	39.40	-8.21	36.27
0.000000	21.710000	33.42	-7.73	19.25
0.000000	25.350000	24.45	-7.72	6.86
0.000000	29.440000	18.28	-7.53	3.45



Performed by:

Fred Chastain, Test Technician

Name of Test: Necessary Bandwidth and Emission Bandwidth

Specification: 47 CFR 2.202(g)

Modulation = GFSK

Necessary Bandwidth Calculation:

99% Power Bandwidth

1.175MHz



Performed by:

Fred Chastain, Test Technician

Name Of Test: Maximum Permissible Exposure
Specification: FCC: 47 CFR 1.1310
Test Conditions: S. T. & H.
Spec. Limit: 1.0 mW/cm²
Guide: IEEE C95.1-1991
 IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Field, 3 kHz to 300 GHz.

Ref: Reference Data for Radio Engineers, Fifth Ed., p. 25-7
 FCC Supplement OET 65-C

$$P = P_t / 4\pi R^2$$

Where P = Power Density (in W/m²) at a distance R
 P_t = Power radiated by an isotropic radiator (Watts)
 = (Transmitter Power)%(Duty Cycle)%(Antenna Gain)
 P = Distance of measurement from source (meters)

Arrangement	Power Watts	Duty Cycle (Factor)	Antenna Gain (Factor)	P _t W Calc / Measured	P W/m	P mW/cm
Omni	0.200	100% (1)	7dBi (5.0)	1.0 / 1.0	1.99	0.199
Directional	0.200	100% (1)	11dBi (12.6)	2.5 / 2.4	5.01	0.501



Calculated By: David E. Lee, FCC Compliance Manager

**Mandatory Safety Instructions to Installers & Users
(To be placed in the Instruction Manual)**

Antenna Minimum Safe Distance: 20cm.

Antenna Gain: up to 11dBi (referenced to isotropic)

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy, which is below the OSHA (Occupational Safety and Health Act) limits.

Antenna Mounting: The antenna supplied by the manufacturer or radio dealer must not be mounted at a location such that during radio transmission, any person or persons can come closer than the above indicated minimum safe distance to the antenna i.e. **20cm**.

To comply with current FCC RF Exposure limits, the antenna must be installed at or exceeding the minimum safe distance shown above, and in accordance with the requirements of the antenna manufacturer or supplier.

Antenna Substitution: Do not substitute any antenna for the one supplied or recommended by the manufacturer or radio dealer. You may be exposing person or persons to excess radio frequency radiation. You may contact your radio dealer or the manufacturer for further instructions.

Warning: Maintain a separation distance from the antenna to a person(s) of at least **20cm**.

You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure the minimum separation distance (above) is maintained between the antenna and nearby persons for satisfying RF Exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational /Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

Radiated Measurements For Part 15 Transmitters with Integral Antennas

Radiated Measurements

Range Of Measurement	Specification	Resolution B/W	Video B/A
30 to 1000 MHz	CISPR	=100 kHz	=100 kHz
>1000 MHz	FCC, 15.37(b)	1 MHz	=1 MHz
(if averaging)	FCC, 15.37(b)	1 MHz	10 Hz

Measuring Equipment

a. Antennas:

EMCO 3109	20 - 300 MHz
APREL AALP2001	200 - 1000 MHz
APREL AAB20200	20 - 200 MHz
APREL AAH118	1 - 18 GHz

b. Instruments:

HP8566B	Spectrum Analyzer
HP85685A	Preselector, w/ preamp below 2 GHz
HP85650A	Quasi Peak Adapter
HP8449	Preamp, above 2 GHz

Occupied Bandwidth

Occupied Bandwidth is measured as a radiated signal without attenuators and/or filter. RBW, VBW and scan settings as shown were set to produce a meaningful result in accordance with ANSI C63.4, Section 13.1.7.

Part 15.21, Information to User

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly avoided by the party responsible for compliance could void the user's authority to operate the equipment.

§ 15.205 Restricted Bands of Operation

(a) Except as shown in paragraph (b) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69625	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-339.4	3600-4400	
13.36-13.41			

**Testimonial
and
Statement of Certification**

This is to certify that:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
2. **That** the technical data supplied with the application was taken under my direction and supervision.
3. **That** the data was obtained on representative units, randomly selected.
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.



Certifying Engineer:

David E. Lee, FCC Compliance Manager