



M. Flom Associates, Inc.

International Compliance Testing Laboratory

3356 N. San Marcos Place, Suite 107
Chandler, AZ 85225

toll-free: (866) 311-3268
fax: (480) 926-3598

<http://www.mflom.com>
info@mflom.com

Date: September 20, 2004

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Thrane & Thrane A/S
Equipment: TT-5038A
FCC ID: ROJAERO-HSU
FCC Rules: 87, Confidentiality

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,

A handwritten signature in black ink, appearing to read 'Michael Schafer', with a long, sweeping horizontal line extending to the right.

Michael Schafer,
General Manager

enclosure(s)
cc: Applicant
MS/del



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Transmitter Certification

of

FCC ID: ROJAERO-HSU
Model: TT-5038A

to

Federal Communications Commission

Rule Part(s) 87, Confidentiality

Date of report: August 13, 2004

On the Behalf of the Applicant:

Thrane & Thrane A/S

At the Request of:

P.O. W.T. 7/20/2004

Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

Attention of:

Bror Malm, Director, Development, AERO Satcom Products
+45 39 55 88 24; FAX: +45 39 55 88 88
Email: bma@tt.dk
Thomas T. West, Development Engineer
+45 39 55 83 77; FAX: +45 39 55 88 88
Email: ttw@tt.dk

Supervised by:

David E. Lee,
Compliance Test Manager

List of Exhibits

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

Applicant: Thrane & Thrane A/S

FCC ID: ROJAERO-HSU

By Applicant:

1. Letter of Authorization
2. Confidentiality Request: 0.457 And 0.459
3. AMSS MOPS Attestation
4. Identification Drawings, 2.1033(c)(11)
 - Label
 - Location of Label
 - Compliance Statement
 - Location of Compliance Statement
5. Photographs, 2.1033(c)(12)
6. Documentation: 2.1033(c)
 - (3) User Manual
 - (9) Tune Up Info
 - (10) Schematic Diagram
 - (10) Circuit Description
 - Block Diagram
 - Parts List
 - Active Devices
7. MPE Report

By M.F.A. Inc.:

- A. Testimonial & Statement of Certification

The Applicant has been cautioned as to the following:**15.21 Information to the 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: d0480028
- d) Client: Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark
- e) Identification: TT-5038A
FCC ID: ROJAERO-HSU
EUT Description: Airborne Satellite Communication System
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: August 13, 2004
EUT Received: July 28, 2004
- 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,
Compliance Test 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.

Accessories used during testing:

Type	Quantity	Manufacturer	Model	Serial No.	FCC ID
Test System	1	Thrane & Thrane	AERO-HSD	NSD	ROJARO-HSD

Page Number

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Sub-part

2.1033(c)(14):**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 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts:

- ☐ 21 – Domestic Public Fixed Radio Services
- ☐ 22 – Public Mobile Services
- ☐ 22 Subpart H - Cellular Radiotelephone Service
- ☐ 22.901(d) - Alternative technologies and auxiliary services
- ☐ 23 – International Fixed Public Radiocommunication services
- ☐ 24 – Personal Communications Services
- ☐ 74 Subpart H - Low Power Auxiliary Stations
- ☐ 80 – Stations in the Maritime Services
- ☐ 80 Subpart E - General Technical Standards
- ☐ 80 Subpart F - Equipment Authorization for Compulsory Ships
- ☐ 80 Subpart K - Private Coast Stations and Marine Utility Stations
- ☐ 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
- ☐ 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
- ☐ 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
- ☐ 80 Subpart V - Emergency Position Indicating Radio Beacons (EPIRB'S)
- ☐ 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
- ☐ 80 Subpart X - Voluntary Radio Installations
- ☒ 87 – Aviation Services
- ☐ 90 – Private Land Mobile Radio Services
- ☐ 94 – Private Operational-Fixed Microwave Service
- ☐ 95 Subpart A - General Mobile Radio Service (GMRS)
- ☐ 95 Subpart C - Radio Control (R/C) Radio Service
- ☐ 95 Subpart D - Citizens Band (CB) Radio Service
- ☐ 95 Subpart E - Family Radio Service
- ☐ 95 Subpart F - Interactive Video and Data Service (IVDS)
- ☐ 97 - Amateur Radio Service
- ☐ 101 – Fixed Microwave Services

**Standard Test Conditions
and
Engineering Practices**

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

In accordance with ANSI C63.4-1992/2001, section 6.1.9, 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.

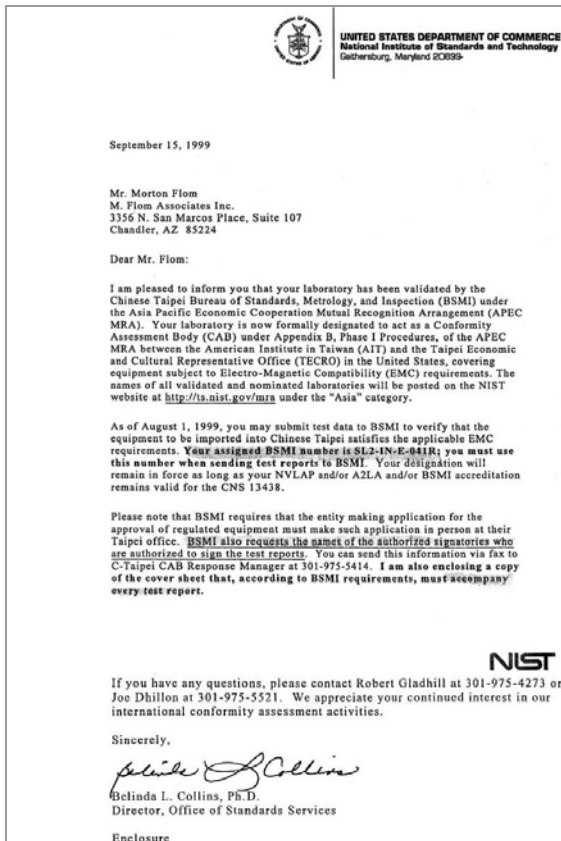
Measurement results, unless otherwise noted, are worst-case measurements.



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**



NIST

I am pleased to inform you that your laboratory has been validated by the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Your laboratory is now formally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA between the American Institute in Taiwan (AIT) and the Taipei Economic and Cultural Representative Office (TECRO) in the United States, covering equipment subject to Electro-Magnetic Compatibility (EMC) requirements. The names of all validated and nominated laboratories will be posted on the NIST website at <http://ts.nist.gov/mra> under the 'Asia' category."

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List of General Information Required for Certification

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

87, Confidentiality

Sub-part 2.1033**(c)(1): Name and Address of Applicant:**

Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

Manufacturer:

Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

(c)(2): FCC ID:

ROJAERO-HSU

Model Number:

TT-5038A

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

Please see attached exhibits

(c)(4): Type of Emission:

21K0G1D
40K0G1D

(c)(5): Frequency Range, MHz:

1643.0 – 1660.5MHz

(c)(6): Power Rating, Watts:☐ Switchable☒ Variable

1 to 20

☐ N/A**(c)(7): Maximum Power Rating, Watts:**

300

DUT Results:

Passes ☒ Fails ☐

Page Number

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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	=	4.5
Collector Voltage, Vdc	=	26.5
Supply Voltage, Vdc	=	28.0

(c)(9): **Tune-Up Procedure:**

Please see attached exhibits

(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

Page Number 7 of 28.

Name of Test: Carrier Output Power (Conducted)

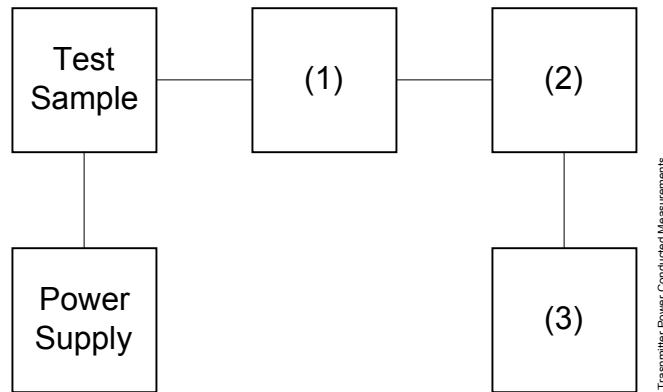
Specification: 47 CFR 2.1046(a)

Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.1

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		
(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			
X	i00020 HP 8901A Power Mode	2105A01087	12 mo	Apr-04
(3)	Frequency Counter			
X	i00020 HP 8901A Frequency Mode	2105A01087	12 mo	Apr-04

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Measurement Results

(Worst case)

Frequency of Carrier, MHz = 1643.5, 1631.5, 1660.5
Ambient Temperature = 23°C ± 3°C

Power Setting	RF Power, Watts
Low	1
High	20

Performed by:

Samir Mahmoud,
Test Technician

Page Number 9 of 28.

Name of Test: RF Power Output (Radiated)

Specification: 47 CFR 2.1046(a)

Test Equipment: As per attached page

Measurement Procedure (Radiated)

1. The EUT was placed on an open-field site and its radiated field strength at a known distance was measured by means of a spectrum analyzer. Equivalent loading was calculated from the equation $P_t = ((E \times R)^2 / 49.2)$ watts, where $R = 3m$.
2. Transmitter Antenna gain = 5dBi. This added to Correction Factor (CF)
3. Measurement accuracy is ± 1.5 dB.

Measurement Results

g0470003: 2004-Jul-28 Wed 11:44:00
State: 2:High Power

Ambient Temperature: 33°C \pm 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV/m	CF, dB	ERP, dBm	ERP, Watts
1643.480000	1643.480000	96.32	41.85	40.8	
1643.480000		Path Loss =	+2.0	42.8	19.05

g0470004: 2004-Jul-28 Wed 12:08:00
State: 2:High Power

Ambient Temperature: 33°C \pm 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV/m	CF, dB	ERP, dBm	ERP, Watts
1660.500000	1660.480000	95.15	42.13	39.9	
1660.500000		Path Loss =	+2.8	42.7	18.62

g0470005: 2004-Jul-28 Wed 12:19:00
State: 2:High Power

Ambient Temperature: 33°C \pm 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV/m	CF, dB	ERP, dBm	ERP, Watts
1631.500000	1631.475000	96.47	41.64	40.7	
1631.500000		Path Loss =	+2.3	43.0	19.95

Performed by:



Samir Mahmoud,
Test Technician

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Name of Test: Unwanted Emissions (Transmitter Conducted)

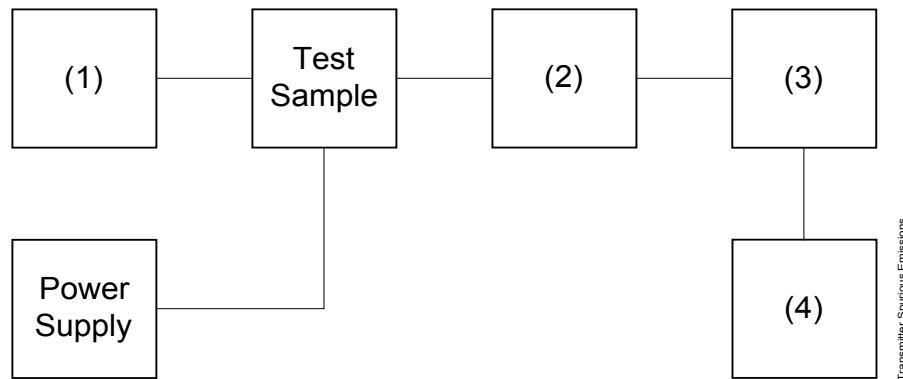
Specification: 47 CFR 2.1051

Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.13

Measurement Procedure

- A) The emissions were measured for the worst case as follows:
- 1). within a band of frequencies defined by the carrier frequency plus and minus one channel.
 - 2). from the lowest frequency generated in the EUT and to at least the 10th harmonic of the carrier frequency, or 40 GHz, whichever is lower.
- B) The magnitude of spurious emissions that are attenuated more than 20 dB below the permissible value need not be specified.

Transmitter Test Set-Up: Spurious Emission



Asset	Description	s/n		
(1) Audio Oscillator/Generator				
X i00017	HP 8903A Audio Analyzer	2216A01753	12 mo	
i00002	HP 3336B Synthesizer / Level Gen.	1931A01465	12 mo	
(2) Coaxial Attenuator				
X i00231/2	PASTERNAK PE7021-30 (30 dB)	231 or 232	NCR	
i0012/3	NARDA 766 (10 dB)	7802 or 7802A	NCR	
(3) Filters; Notch, HP, LP, BP				
i00126	Eagle TNF-1 Notch Filter	100-250	NCR	
i00125	Eagle TNF-1 Notch Filter	50-60	NCR	
i00124	Eagle TNF-1 Notch Filter	250-850	NCR	
(4) Spectrum Analyzer				
X i00048	HP 8566B Spectrum Analyzer	2511A01467	12 mo	Jul-04
i00029	HP 8563E Spectrum Analyzer	3213A00104	12 mo	Mar-04

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Name of Test: Unwanted Emissions (Transmitter Conducted)

Measurement Results
(Worst Case)

Summary:

Frequency of carrier, MHz	=	1643.5, 1631.5, 1660.5
Spectrum Searched, GHz	=	0 to 10 x F _C
Maximum Response, Hz	=	2800
All Other Emissions	=	≥ 20 dB Below Limit
Limit(s), dBc		50 + Log10(P)

Measurement Results

No emissions found greater than -20dB below limit

Performed by:



David E. Lee,
Compliance Test Manager

Page Number 12 of 28.

Name of Test: Radiated Spurious Emissions

Measurement Results

Ambient Temperature: 28°C ± 3°C

g0470002: 2004-Jul-28 Wed 09:31:00

STATE: 2:High Power

Ambient Temperature: 23°C ± 3°C

Frequency Emission, MHz	Level, @ m dBuV		C.F., dB	μV/m @ m	Margin, dB
30.000000	9.54	3	14.22	15.42	3 -16.2
36.860300	8.66	3	13.22	12.42	3 -18.1
39.340000	14.32	3	13.74	25.29	3 -11.9
47.970000	15.68	3	13.64	29.24	3 -10.7
60.000000	15.78	3	11.98	24.43	3 -12.2
70.000000	3.33	3	9.95	4.61	3 -26.7
73.730500	14.77	3	9.69	16.71	3 -15.5
86.026000	10.95	3	10.23	11.46	3 -18.8
107.530000	11.06	3	13.09	16.13	3 -18.9
119.880000	10.35	3	14.11	16.71	3 -18.5
129.034000	6.80	3	14.69	11.87	3 -21.5
130.010000	12.71	3	14.73	23.55	3 -15.6
139.925000	13.36	3	15.13	26.58	3 -14.5
147.451000	13.45	3	15.43	27.8	3 -14.1
152.200000	11.38	3	15.52	22.13	3 -16.1
159.992500	17.91	3	15.54	47.04	3 -9.6
169.970000	12.72	3	15.58	26.00	3 -14.7
179.985000	10.49	3	16.00	21.11	3 -16.5
188.006400	19.24	3	16.62	62.09	3 -7.1
199.693000	22.65	3	17.48	101.51	3 -2.9
236.537000	18.45	3	19.9	82.70	3 -7.7
257.980000	16.53	3	22.36	88.00	3 -7.1
258.046000	16.48	3	22.37	87.6	3 -7.2
290.000000	5.67	3	28.50	51.11	3 -11.8
300.000000	5.53	3	30.28	61.73	3 -10.2
322.585000	5.65	3	20.36	19.98	3 -20
339.995000	16.74	3	20.92	76.38	3 -8.3
344.027000	12.03	3	21.05	45.08	3 -12.9
359.995000	20.25	3	21.52	122.60	3 -4.2
379.995000	15.44	3	22.10	75.34	3 -8.5
408.576000	5.05	3	22.85	24.83	3 -18.1
445.140000	2.12	3	23.71	19.57	3 -20.2
451.609000	8.64	3	23.85	42.12	3 -13.5

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Name of Test: Radiated Spurious Emissions (Continued)

Measurement Results

g0470002: 2004-Jul-28 Wed 09:31:00

STATE: 2:High Power

Ambient Temperature: 23°C ± 3°C

Frequency Emission, MHz	Level, @ m dBuV		C.F., dB	μV/m @ m		Margin, dB
459.995000	4.65	3	24.03	27.16	3	-17.3
494.555000	4.09	3	24.75	27.67	3	-17.2
500.000000	3.25	3	24.86	25.44	3	-17.9
516.121000	5.59	3	25.93	37.67	3	-14.5
559.017000	0.3	3	28.60	27.86	3	-17.1
666.612000	1.93	3	32.44	52.30	3	-11.6
709.695000	0.57	3	33.05	47.97	3	-12.4
737.280000	1.76	3	32.83	53.64	3	-11.4
752.025600	-2.71	3	32.72	31.66	3	-16.0
774.169000	-3.58	3	32.56	28.12	3	-17.0
817.152000	0.87	3	32.63	47.32	3	-12.5
847.870000	1.30	3	33.11	52.54	3	-11.6
903.168000	0.11	3	34.09	51.29	3	-11.8
921.600000	-1.70	3	34.89	45.66	3	-12.8
967.680000	0.36	3	36.81	72.19	3	-16.8
989.184000	-4.15	3	37.68	47.48	3	-20.5
995.328000	2.99	3	38.32	116.28	3	-12.7

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



Performed by:

David E. Lee,
Compliance Test Manager

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Name of Test: Emission Masks (Occupied Bandwidth)

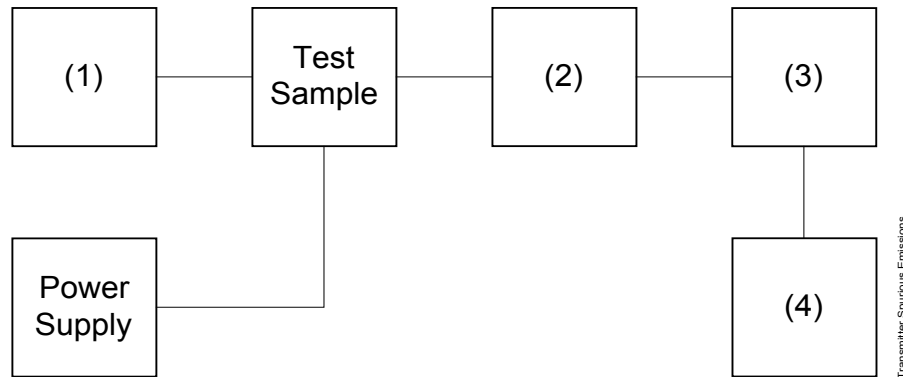
Specification: 47 CFR 2.1049(c)(1)

Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.11

Measurement Procedure

- A) The EUT and test equipment were set up as shown below
- B) For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for $\pm 2.5/\pm 1.25$ kHz deviation (or 50% modulation). With level constant, the signal level was increased 16 dB.
- C) For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.
- D) The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

Transmitter Test Set-Up: Occupied Bandwidth



Asset	Description	s/n		
(1) Audio Oscillator/Generator				
X i00017	HP 8903A Modulation Meter	2216A01753	12 mo	
(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	12 mo	Apr-04
(4) Spectrum Analyzer				
X i00048	HP 8566B Spectrum Analyzer	2511A01467	12 mo	Jul-03
i00029	HP 8563E Spectrum Analyzer	3213A00104	12 mo	Mar-04

Page Number 15 of 28.

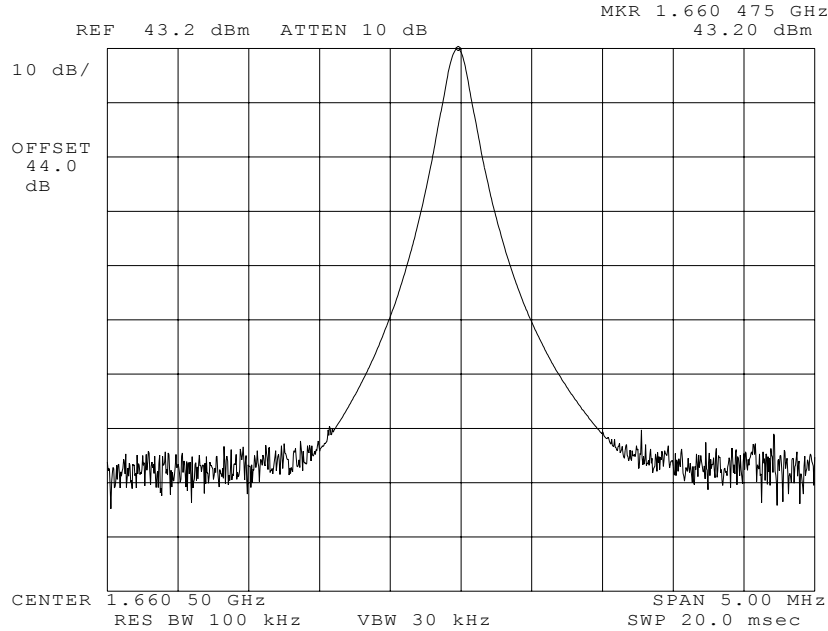
Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0470007: 2004-Jul-28 Wed 14:15:00

State: 2:High Power


Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
NONE
POWER REFERENCE

Performed by:


David E. Lee,
Compliance Test Manager

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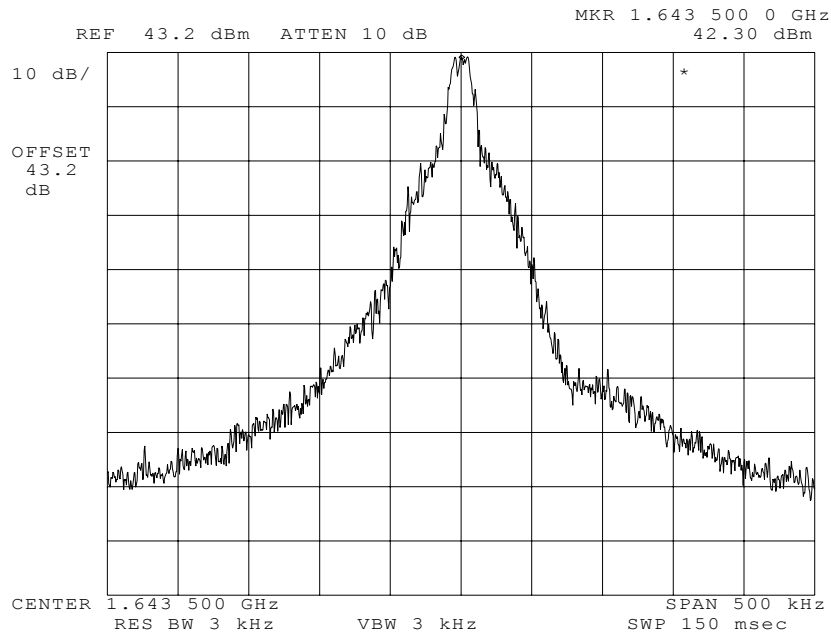
Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0470013: 2004-Jul-28 Wed 14:36:00

State: 2:High Power


Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
BANDWIDTH EDGES
21K0G1D

Performed by:


David E. Lee,
Compliance Test Manager

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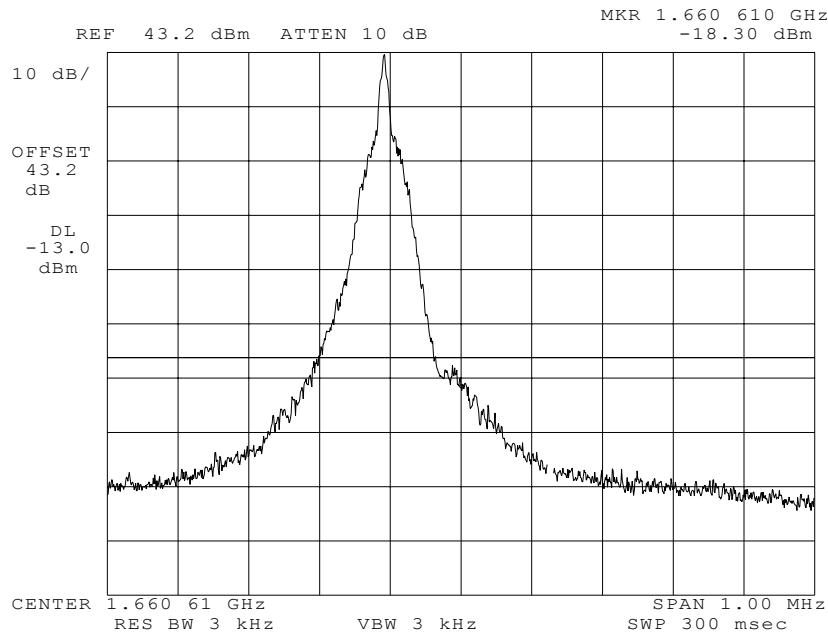
Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0470011: 2004-Jul-28 Wed 14:33:00

State: 2:High Power


Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
UPPER BAND EDGE
21K0G1D

Performed by:


David E. Lee,
Compliance Test Manager

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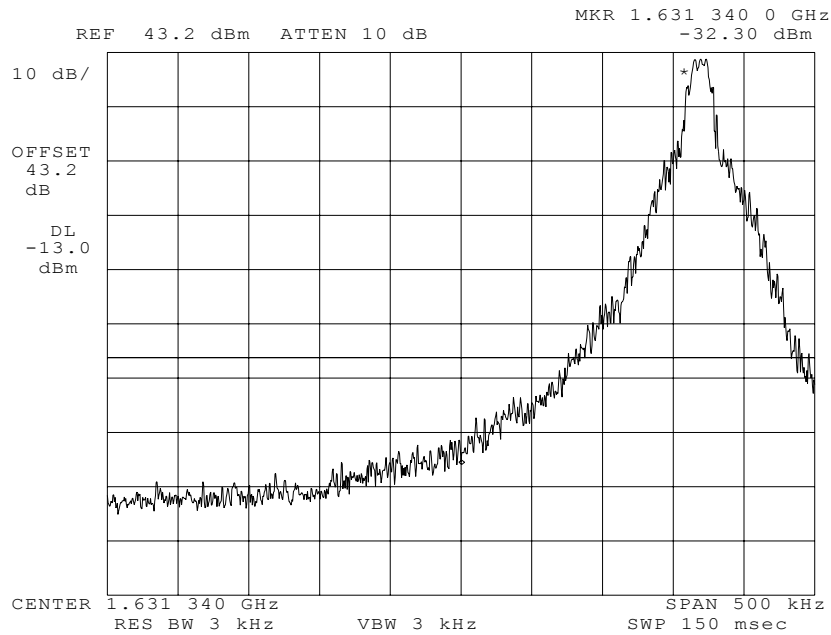
Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0470014: 2004-Jul-28 Wed 14:40:00

State: 2:High Power


Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
LOWER BAND EDGE
21K0G1D

Performed by:


David E. Lee,
Compliance Test Manager

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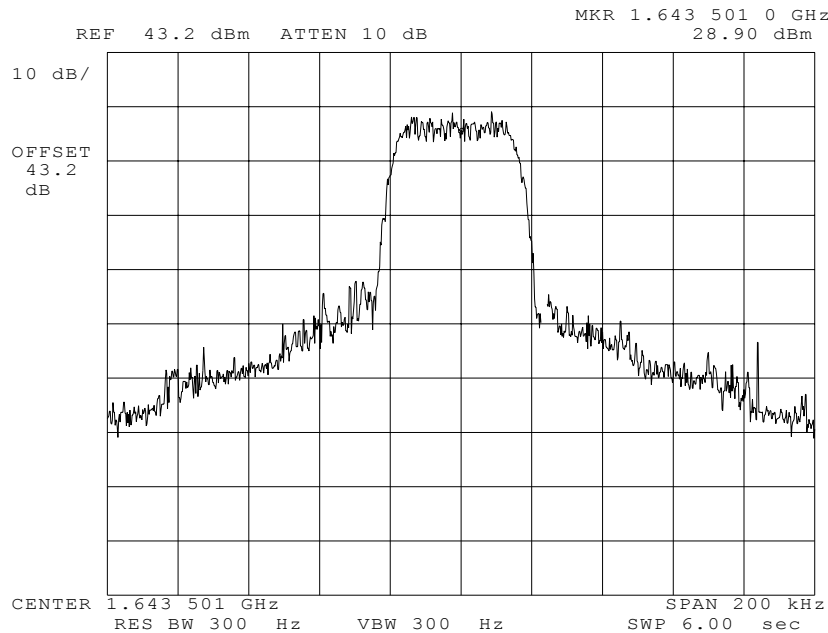
Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0470015: 2004-Jul-28 Wed 14:46:00

State: 2:High Power


Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
16QAM
40K0G1D

Performed by:


David E. Lee,
Compliance Test Manager

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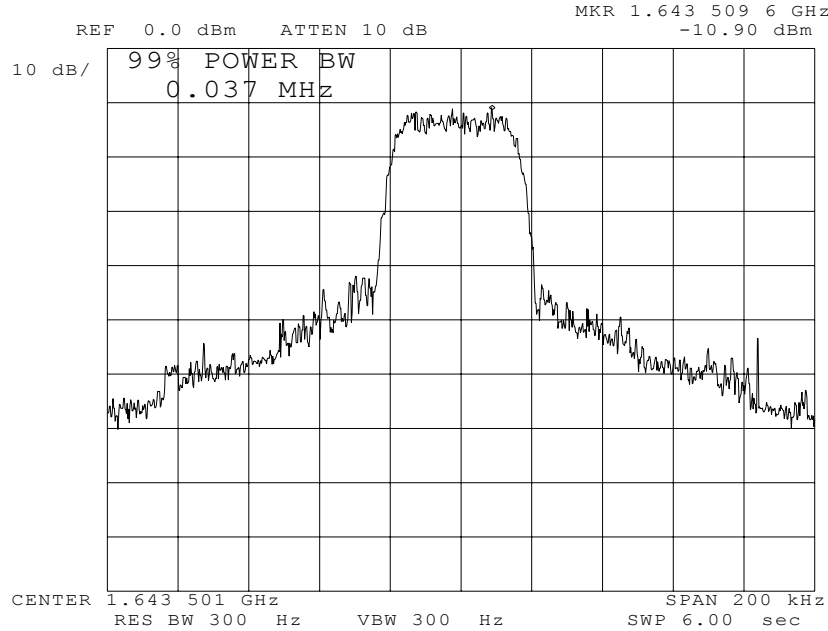
Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0470016: 2004-Jul-28 Wed 14:47:00

State: 2:High Power


Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
99.9% POWER BANDWIDTH
40K0G1D

Performed by:


David E. Lee,
Compliance Test Manager

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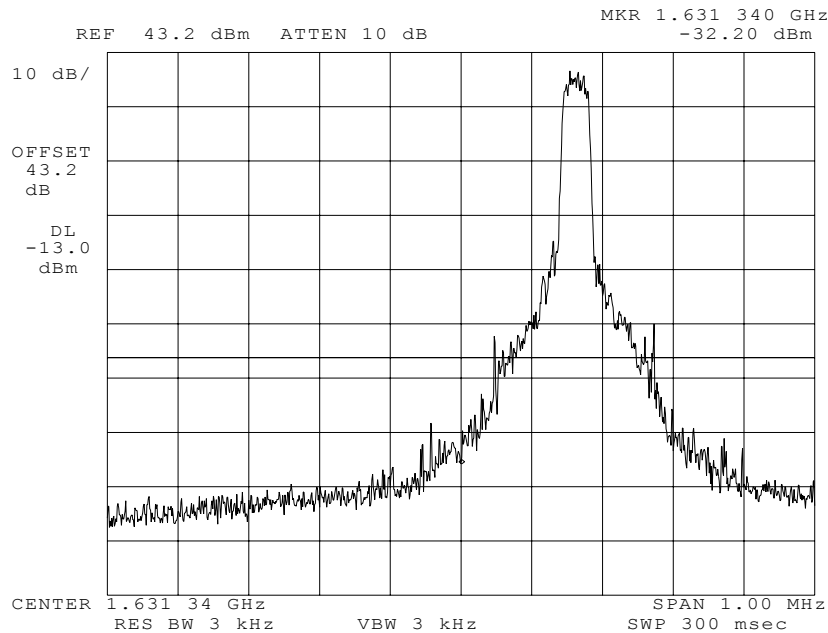
Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0470017: 2004-Jul-28 Wed 14:49:00

State: 2:High Power


Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
LOWER BAND EDGE
40K0G1D

Performed by:


David E. Lee,
Compliance Test Manager

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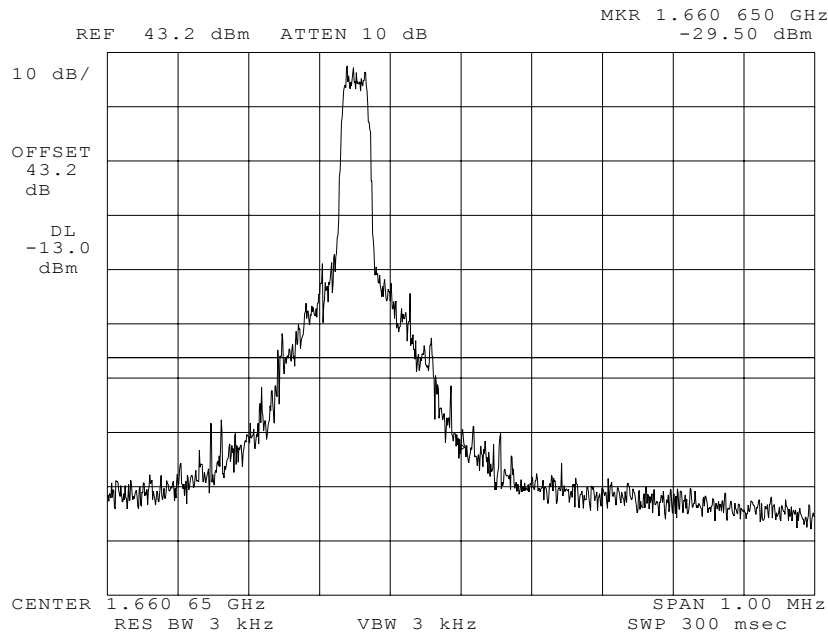
Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0470018: 2004-Jul-28 Wed 14:51:00

State: 2:High Power


Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
UPPER BAND EDGE
40K0G1D

Performed by:


David E. Lee,
Compliance Test Manager

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Name of Test: Frequency Stability (Temperature Variation)

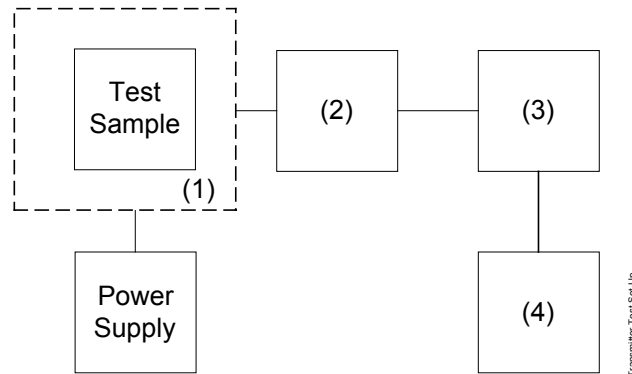
Specification: 47 CFR 2.1055(a)(1)

Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.2

Measurement Procedure

- A) The EUT and test equipment were set up as shown on the following page.
- B) With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
- C) With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
- D) The temperature tests were performed for the worst case.

Transmitter Test Set-Up: Temperature Variation



Asset	Description	s/n		
(1) Temperature, Humidity, Vibration				
X i00027	Tenney Temp. Chamber	9083-765-234	NCR	
(2) Coaxial Attenuator				
X i00231/2	PASTERNAK PE7021-30 (30 dB)	231 or 232	NCR	
i00122/3	NARDA 766 (10 dB)	7802 or 7802A	NCR	
(3) RF Power				
X i00067	HP 8920A Communications TS	3345U01242	12 mo	May-04
(4) Frequency Counter				
X i00067	HP 8920A Communications TS	3345U01242	12 mo	May-04

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Name of Test: Frequency Stability (Temperature Variation)

Measurement Results

g0470061: 2004-Jul-29 Thu 11:47:36

State: 0:General

Ambient Temperature: 23°C ± 3°C

<u>Degrees (C)</u>	<u>Frequency (Hz)</u>	<u>Variation (Hz)</u>
-20	1643499864	-136
-10	1643499853	-147
0	1643499834	-166
10	1643499847	-153
20	1643499844	-156
25	1643500170	0
30	1643499843	157
40	1643499861	-139
50	1643499890	-110

Performed by:



David E. Lee,
Compliance Test Manager

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Name of Test: Frequency Stability (Voltage Variation)

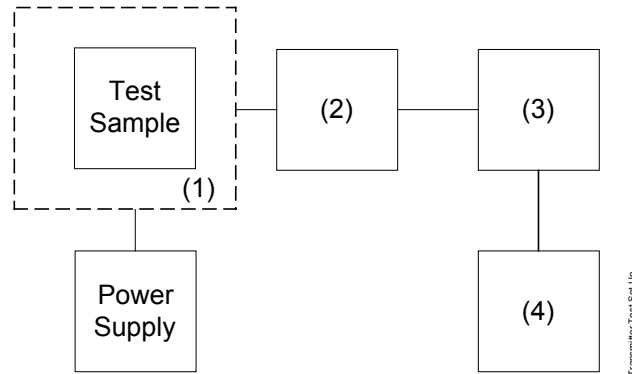
Specification: 47 CFR 2.1055(d)(1)

Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.2

Measurement Procedure

- A) The EUT was placed in a temperature chamber (if required) at $25\pm 5^{\circ}\text{C}$ and connected as shown below.
- B) The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
- C) The variation in frequency was measured for the worst case.

Transmitter Test Set-Up: Voltage Variation



Asset	Description	s/n		
(1) Temperature, Humidity, Vibration				
i00027	Tenney Temp. Chamber	9083-765-234	NCR	
(2) Coaxial Attenuator				
X i00231/2	PASTERNAK PE7021-30 (30 dB)	231 or 232	NCR	
i00122/3	NARDA 766 (10 dB)	7802 or 7802A	NCR	
(3) RF Power				
X i00020	HP 8901A Power Mode	2105A01087	12 mo	May-04
(4) Frequency Counter				
X i00020	HP 8901A Frequency Mode	2105A01087	12 mo	May-04

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Results: Frequency Stability (Voltage Variation)

State:

Ambient Temperature: 23°C ± 3°C

% of STV	Voltage	Frequency (kHz)	Change, Hz	Change, ppm
115	32.2	1643500.5	1	0
100	28	1643500.4	0	0
85	23.8	1643500.4	1	0

Performed by:

David E. Lee,
Compliance Test Manager

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Name of Test: Necessary Bandwidth and Emission Bandwidth

Specification: 47 CFR 2.202(g)

Modulation = 21K0G1D

Necessary Bandwidth Calculation:


Maximum Modulation (M), kHz	3.1 (14.4kbs)
Maximum Deviation (D), kHz	= 7.4
Constant Factor (K)	= 1
Necessary Bandwidth (B _N), kHz	= (2xM)+(2xDxK) (2x3.1)+(2x7.4x1) 6.2+14.8 = 21.0

Modulation = 40K0G1D

Necessary Bandwidth Calculation:

Maximum Modulation (M), kHz	13.1 (64kbs)
Maximum Deviation (D), kHz	= 7.4
Constant Factor (K)	= 1
Necessary Bandwidth (B _N), kHz	= (2xM)+(2xDxK) (2x12.4)+(2x7.4x1) 26.2+14.8 = 40.0

Performed by:


David E. Lee,
Compliance Test Manager

END OF TEST REPORT

**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 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,
Compliance Test Manager.