

**M. Flom Associates, Inc. - Global Compliance Center**

3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176

www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

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Date: September 24, 1999

Federal Communications Commission  
EQUIPMENT APPROVAL SERVICES  
P.O. Box 358315  
Pittsburgh, PA 15251-5315

Attention: Authorization &amp; Evaluation Division

Applicant: Niigata Seimitsu Co Ltd  
Equipment: NSA2010  
FCC ID: NTRNSA2010  
FCC Rules: 22H

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, reading "Morton Flom, P. Eng.", is written over a horizontal line.

Morton Flom, P. Eng.

enclosure(s)  
Electronically Filed

cc: Applicant  
MF/cvr

LIST OF EXHIBITS  
(FCC **CERTIFICATION** (CELLULAR TRANSMITTERS) - REVISED 9/28/98)

APPLICANT: Niigata Seimitsu Co Ltd

FCC ID: NTRNSA2010

BY APPLICANT:

1. LETTER OF AUTHORIZATION
2. IDENTIFICATION DRAWINGS, 2.1033(c)(11)
  - \_\_\_ LABEL
  - \_\_\_ LOCATION OF LABEL
  - \_\_\_ COMPLIANCE STATEMENT
  - \_\_\_ LOCATION OF COMPLIANCE STATEMENT
3. PHOTOGRAPHS, 2.1033(c)(12)
4. CONFIDENTIALITY REQUEST: 0.457 and 0.459
5. DOCUMENTATION: 2.1033(c)
  - (3) USER MANUAL
  - (9) TUNE UP INFO
  - (10) SCHEMATIC DIAGRAM
  - (10) CIRCUIT DESCRIPTION
6. ATTESTATION: ESN: Section 22.919
7. ATTESTATION: OET: Section 22.933

BY M.F.A. INC.

- A. TESTIMONIAL & STATEMENT OF CERTIFICATION
- B. STATEMENT OF QUALIFICATIONS



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Sub-part  
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: NTRNSA2010

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

September 24, 1999

SUPERVISED BY:

A handwritten signature in black ink that reads 'M. Flom P. Eng.' The signature is written in a cursive, flowing style.

Morton Flom, P. Eng.

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: d9990060
- d) Mailing Client: Modus Operandi, Inc  
308 Lakeland Drive  
Highland Village, TX 75077
- e) Identification: NSA2010  
FCC ID: NTRNSA2010  
Description: AMPS-FM CELLULAR TRANSCEIVER
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: September 24, 1999  
EUT Received: July 29, 1999
- 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:   
Morton Flom, P. Eng.
- 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.

PAGE NO. 2 of 57.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

IN ACCORDANCE WITH FCC RULES AND REGULATIONS,  
VOLUME II, PART 2 AND TO

22H

Sub-part 2.1033

(c)(1): NAME AND ADDRESS OF APPLICANT:

Niigata Seimitsu Co Ltd  
Shiba Daimon  
116 Bldg 8F, 16-3, 1 Chome  
Minato-Ku, Tokyo, Japan

MANUFACTURER:

Applicant

(c)(2): FCC ID: NTRNSA2010

MODEL NO: NSA2010

(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 40K0F8W, 40K0F1D

(c)(5): FREQUENCY RANGE, MHz: 824.04 to 848.97

(c)(6): POWER RATING, Watts: 0.36 ERP  
x Switchable      Variable      N/A

(c)(7): MAXIMUM POWER RATING, Watts: 0.6

PAGE NO. 3 of 57.

Subpart 2.1033 (continued)

(c)(8): VOLTAGES & CURRENTS IN ALL ELEMENTS IN FINAL R. F. STAGE,  
INCLUDING FINAL TRANSISTOR OR SOLID STATE DEVICE:

COLLECTOR CURRENT, A = per manual  
COLLECTOR VOLTAGE, Vdc = per manual  
SUPPLY VOLTAGE, Vdc = 3.6

(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  
  x   N/A

(c)(14): TEST AND MEASUREMENT DATA:

FOLLOWS



PAGE NO.

4 of 57.

M. Flom Associates, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA) as shown in the scope below.



**THE AMERICAN  
ASSOCIATION  
FOR LABORATORY  
ACCREDITATION**

**ACCREDITED LABORATORY**

A2LA has accredited

**M. FLOM ASSOCIATES, INC.**  
**Chandler, AZ**

for technical competence in the field of

**Electrical (EMC) 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 Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 24<sup>th</sup> day of November, 1998.



*Peter Maye*  
President  
For the Accreditation Council  
Certificate Number 1008.01  
Valid to December 31, 2000

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation



**American Association for Laboratory Accreditation**

**SCOPE OF ACCREDITATION TO ISO/IEC GUIDE 25-1990 AND EN 45001**

**M. FLOM ASSOCIATES, INC.**  
Electronic Testing Laboratory  
3356 North San Marcos Place, Suite 107  
Chandler, AZ 85224-1571  
Moran Flom Phone: 602 926 3100

**ELECTRICAL (EMC)**

Valid to: December 31, 2000 Certificate Number: 1008.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

Tests	Standard(s)
RF Emissions	FCC Part 15 (Subparts B and C) using ANSI C63.4-1992; CISPR 11; CISPR 13; CISPR 14; CISPR 22; EN 55011; EN 55013; EN 55014; EN 55022; EN 55081-1; EN 55081-2; FCC Part 18; ICES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 3548; AS/NZS 4251.1
RF Immunity	EN 50082-1; EN 50082-2; AS/NZS 4251.1
Radiated Susceptibility	EN 61000-4-3; ENV 50140; ENV 50204; IEC 1000-4-3; IEC 801-3
ESD	EN 61000-4-2; IEC 1000-4-2; IEC 801-2
EFT	EN 61000-4-4; IEC 1000-4-4; IEC 801-4
Surge	EN 61000-4-5; ENV 50142; IEC 1000-4-5; IEC 801-5
47 CFR (FCC)	2, 21, 22, 23, 24, 74, 80, 87, 90, 95, 97

*Peter Maye*

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8307 • Phone: 301 644 3200 • Fax: 301 662 2974

"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report."

Should this report contain any data for tests for which we are not accredited, or which have been undertaken by a subcontractor that is not A2LA accredited, such data would not covered by this laboratory's A2LA accreditation.

PAGE NO.

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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
- x   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 Radiobeacons (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

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GENERAL INFORMATION

1. Prior to testing, the deviation for audio modulation and each of the respective SAT + ST tones were set as close as possible to the required limit.
2. Except for audio modulation, which was applied externally, Wideband Data SAT, ST and all other tones and operational modes were provided by a test control unit incorporating appropriate software. Worst case repetition rate for Wideband Data was 10 kb/s.
3. Spurious radiation was measured at three (3) meters.
4. The two cellular frequency bands are available to the user automatically. Please refer to the manual contained in the documentation.
5. The normal modes of modulation are:
  - ☒ (a) VOICE
  - ☒ (b) WIDEBAND DATA
  - ☒ (c) SAT
  - ☒ (d) ST
  - ☒ (e) SAT + VOICE
  - ☒ (f) SAT + DTMF
  - ☐ (g) CDMA
  - ☐ (h) TDMA
  - ☐ (i) NAMPS VOICE
  - ☐ (j) NAMPS DSAT
  - ☐ (k) NAMPS ST
  - ☐ (l) NAMPS VOICE + DSAT

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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, 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.

GUIDES:

This device was tested using the following Guide(s):

TIA/EIA IS-19-B 1998

PAGE NO. 8 of 57.  
NAME OF TEST: Carrier Output Power (Conducted)  
SPECIFICATION: 47 CFR 2.1046(a)  
GUIDE: As indicated on page 7  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT was connected to a resistive coaxial attenuator of normal load impedance, and the unmodulated output power was measured by means of an R. F. Power Meter.
2. Measurement accuracy is  $\pm 3\%$ .

MEASUREMENT RESULTS

NOMINAL, MHz	CHANNEL	R. F. POWER, Watts	
		Low	High
AMPS MODE:			
824.040	991	0.005	0.32
836.400	380	0.005	0.31
848.970	799	0.005	0.31

SUPERVISED BY:

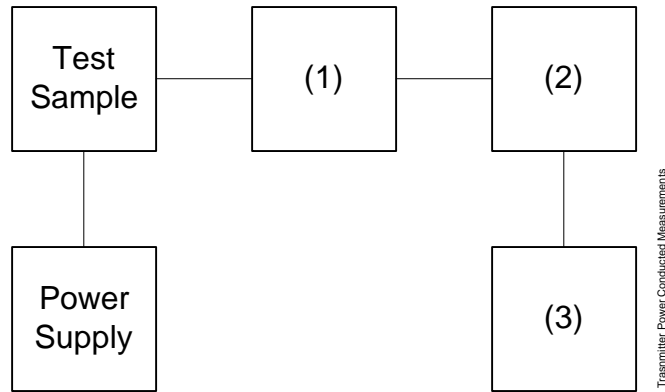
  
 Morton Flom, P. Eng.

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## TRANSMITTER POWER CONDUCTED MEASUREMENTS

TEST 1: R. F. POWER OUTPUT  
 TEST 2: FREQUENCY STABILITY



Asset	Description	s/n
(1)	<u>COAXIAL ATTENUATOR</u>	
<u>x</u>	i00122 Narda 766-10	7802
<u>   </u>	i00123 Narda 766-10	7802A
<u>   </u>	i00069 Bird 8329 (30 dB)	1006
<u>   </u>	i00113 Sierra 661A-3D	1059
(2)	<u>POWER METERS</u>	
<u>   </u>	i00014 HP 435A	1733A05836
<u>x</u>	i00039 HP 436A	2709A26776
<u>x</u>	i00020 HP 8901A POWER MODE	2105A01087
(3)	<u>FREQUENCY COUNTER</u>	
<u>   </u>	i00042 HP 5383A	1628A00959
<u>x</u>	i00019 HP 5334B	2704A00347
<u>x</u>	i00020 HP 8901A FREQUENCY MODE	2105A01087

PAGE NO. 10 of 57.  
NAME OF TEST: R. F. Power Output (Radiated)  
SPECIFICATION: 47 CFR 2.1046(a)  
GUIDE: As indicated on page 7  
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. Measurement accuracy is  $\pm 1.5$  dB.

MEASUREMENT RESULTS

g9990133: 1999-Sep-10 Fri 08:58:00

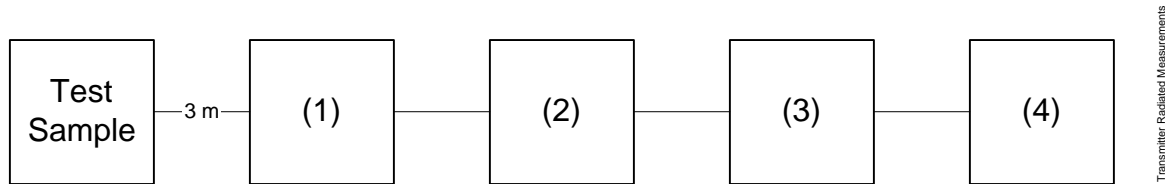
STATE: 2:High Power

AMPS MODE:

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	ERP, dBm	ERP, Watts
824.040000	824.040000	92.49	29.98	25.1	0.32
836.520000	836.520000	91.71	30.01	24.3	0.27
848.970000	848.970000	92.96	30.04	25.6	0.36

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TRANSMITTER RADIATED MEASUREMENTS

Asset	Description	s/n
(1)	<u>TRANSDUCER</u>	
<u>x</u>	i00091 Emco 3115	001469
<u>x</u>	i00089 Aprel Log Periodic	001500
(2)	<u>HIGH PASS FILTER</u>	
<u>x</u>	i00 Narda $\mu$ PAD (In-Band Only)	
<u>x</u>	i00 Trilithic	
	(Out-Of-Band Only)	
(3)	<u>PREAMP</u>	
<u>x</u>	i00028 HP 8449 (+30 dB)	2749A00121
(4)	<u>SPECTRUM ANALYZER</u>	
<u>x</u>	i00048 HP 8566B	2511A01467
	i00057 HP 8557A	1531A00191
<u>x</u>	i00029 HP 8563E	3213A00104



PAGE NO. 12 of 57.  
NAME OF TEST: Audio Frequency Response  
SPECIFICATION: 47 CFR 2.1047(a)  
GUIDE: As indicated on page 7  
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page.
2. The audio signal generator was connected to the audio input circuit/microphone of the EUT.
3. The audio signal input was adjusted to obtain 20% modulation at 1 kHz, and this point was taken as the 0 dB reference level.
4. With input levels held constant and below limiting at all frequencies, the audio signal generator was varied from 100 Hz to 50 kHz.
5. The response in dB relative to 1 kHz was then measured, using the HP 8901A Modulation Analyzer.
6. MEASUREMENT RESULTS: ATTACHED

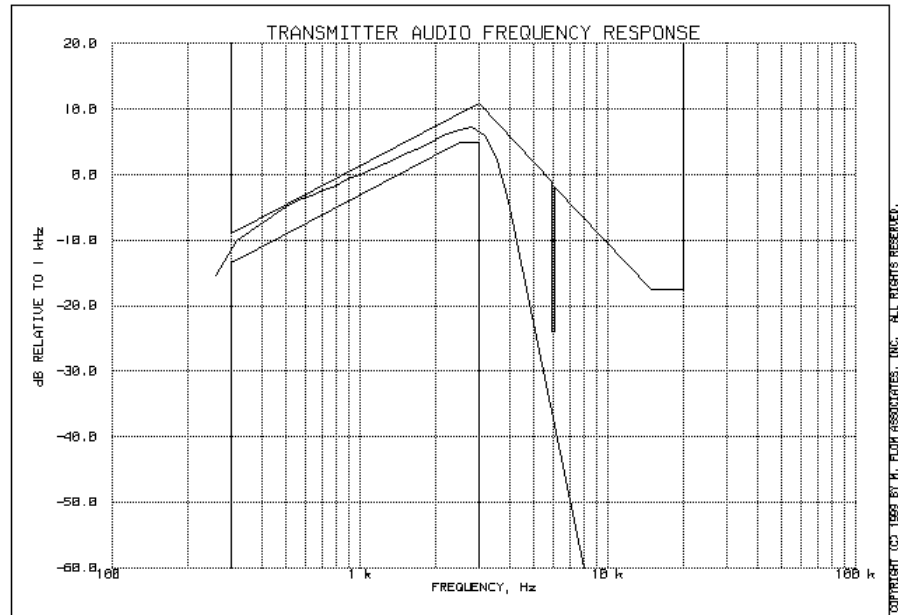
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NAME OF TEST: Audio Frequency Response

g9960280: 1999-Jun-30 Wed 09:01:00

STATE: 0:General



SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 14 of 57.  
NAME OF TEST: Audio Low Pass Filter (Voice Input)  
SPECIFICATION: 47 CFR 2.1047(a)  
GUIDE: As indicated on page 7  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up such that the audio input was connected at the input to the modulation limiter, and the modulated stage.
2. The audio output was connected at the output to the modulated stage.
3. MEASUREMENT RESULTS: ATTACHED

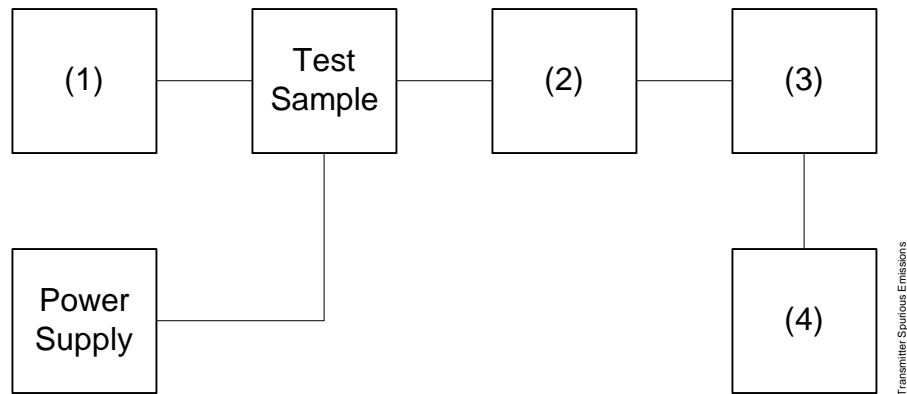
PAGE NO.

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TRANSMITTER SPURIOUS EMISSION

TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)

TEST B. OUT-OF-BAND SPURIOUS

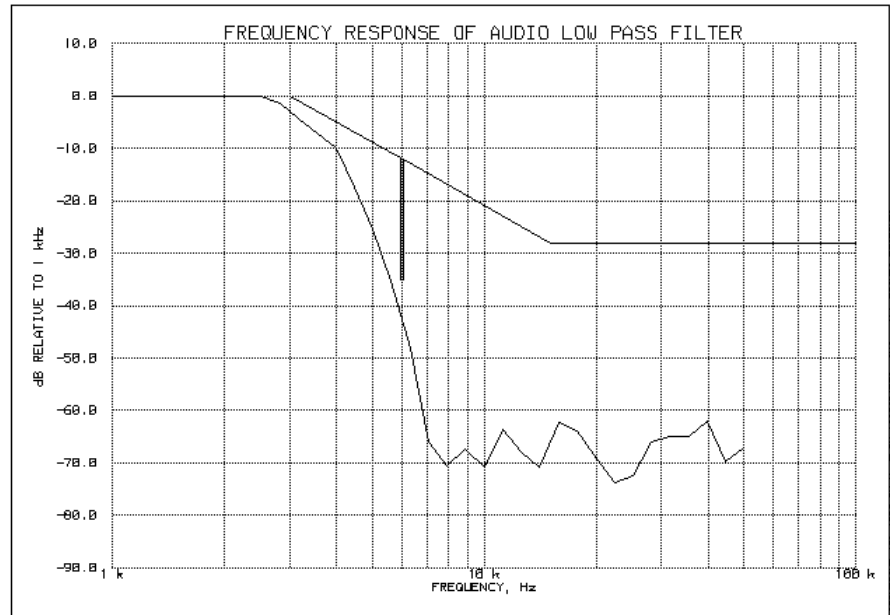


Asset	Description	s/n
(1) <u>AUDIO OSCILLATOR/GENERATOR</u>		
_____	i00010 HP 204D	1105A04683
_____	i00017 HP 8903A	2216A01753
<u>x</u>	i00012 HP 3312A	1432A11250
(2) <u>COAXIAL ATTENUATOR</u>		
_____	i00122 Narda 766-10	7802
_____	i00123 Narda 766-10	7802A
<u>x</u>	i00069 Bird 8329 (30 dB)	1006
<u>x</u>	i00113 Sierra 661A-3D	1059
(3) <u>FILTERS; NOTCH, HP, LP, BP</u>		
<u>x</u>	i00126 Eagle TNF-1	100-250
<u>x</u>	i00125 Eagle TNF-1	50-60
<u>x</u>	i00124 Eagle TNF-1	250-850
(4) <u>SPECTRUM ANALYZER</u>		
<u>x</u>	i00048 HP 8566B	2511A01467
_____	i00029 HP 8563E	3213A00104

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NAME OF TEST: Audio Low Pass Filter (Voice Input)  
g9960279: 1999-Jun-30 Wed 08:55:00  
STATE: 0:General



SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 17 of 57.  
NAME OF TEST: Modulation Limiting  
SPECIFICATION: 47 CFR 2.1047(b)  
GUIDE: As indicated on page 7  
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The audio signal generator was connected to the audio input circuit/microphone of the EUT as for Frequency Response of the Audio Modulating Circuit.
2. The modulation response was measured for each of three tones (one of which was the frequency of maximum response), and the input voltage was varied and was observed on an HP 8901A Modulation Analyzer.
3. The audio input level was varied from 30% modulation ( $\pm 3.6$  kHz deviation) to at least 20 dB higher than the saturation point.
4. Measurements were performed for both negative and positive modulation and the respective results were recorded.
5. MEASUREMENT RESULTS ATTACHED FOR:

COMPANDER ON:

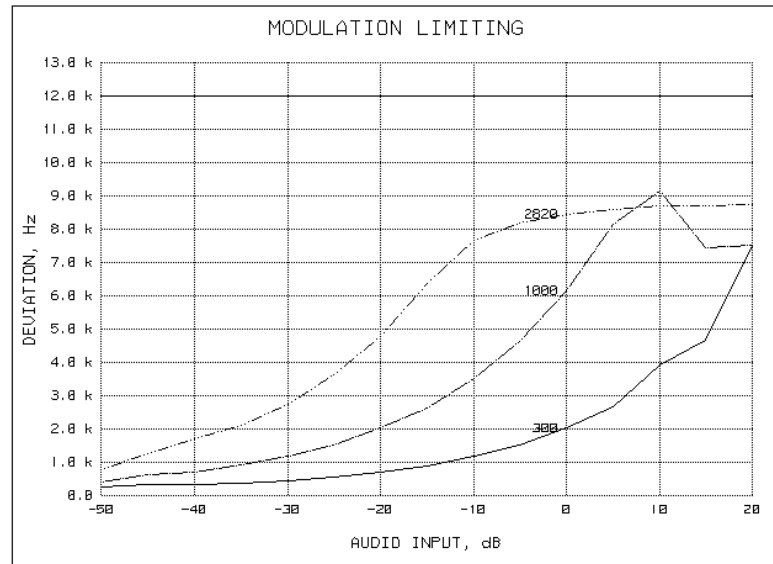
  x   VOICE  
  x   VOICE + SAT

PAGE NO.

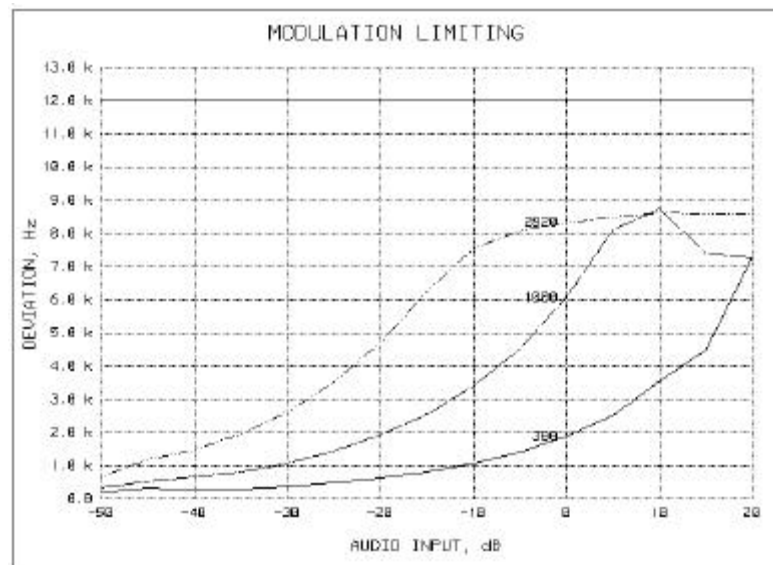
18 of 57.

NAME OF TEST: Modulation Limiting  
 g9960281: 1999-Jun-30 Wed 09:09:00  
 STATE: 0:General Voice only

Positive  
 Peaks:



Negative  
 Peaks:

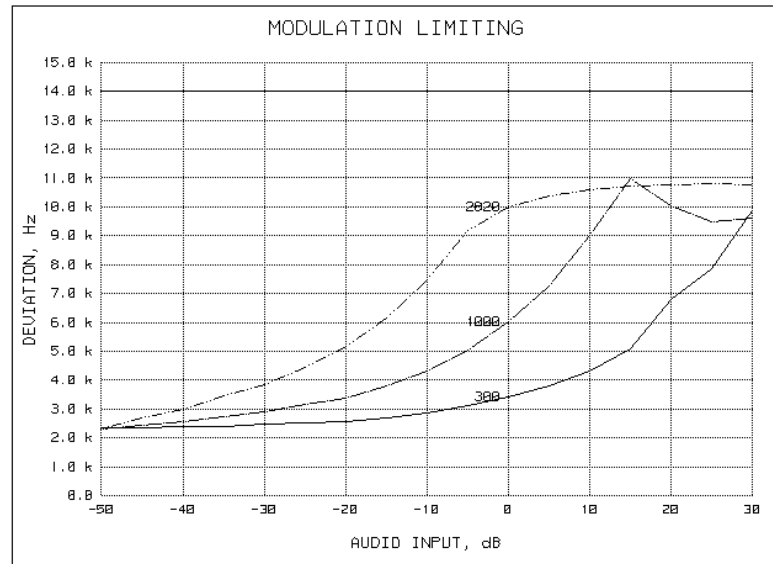


PAGE NO.

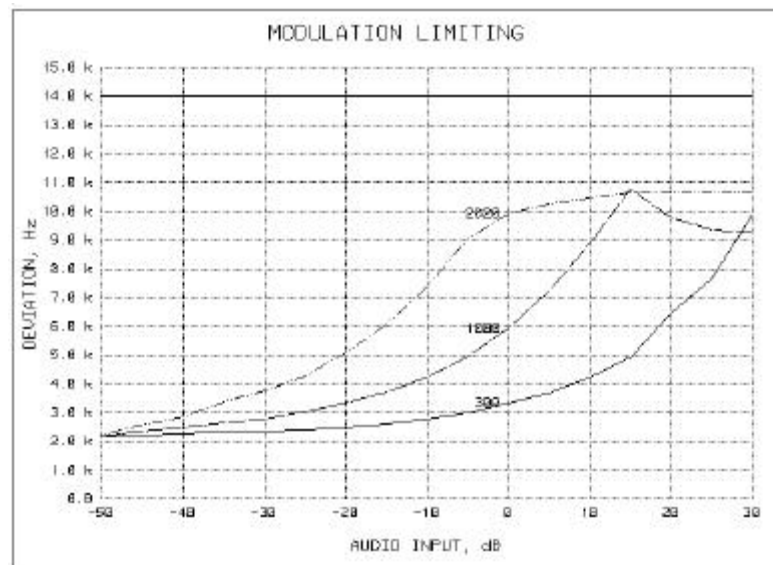
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NAME OF TEST: Modulation Limiting  
 g9960283: 1999-Jun-30 Wed 09:23:00  
 STATE: 0:General Voice + SAT

Positive  
Peaks:



Negative  
Peaks:





PAGE NO. 20 of 57.  
NAME OF TEST: Measurement Of Maximum Deviation  
GUIDE: As indicated on page 7  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

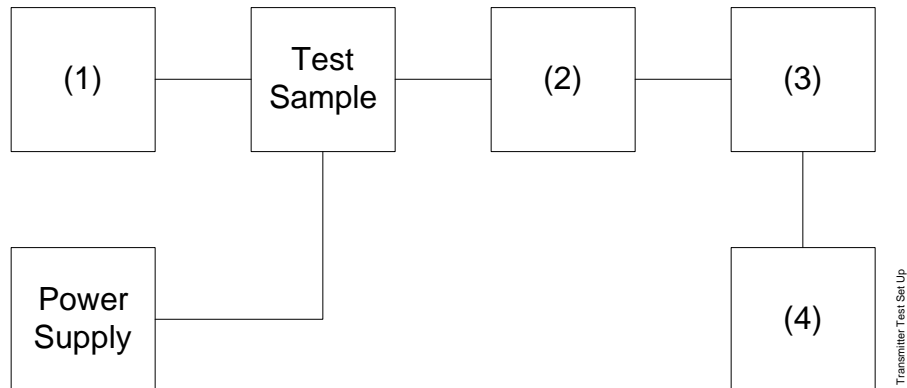
1. The presentation of tones was obtained by attaching the HP 8903A Oscilloscope to the Modulation Output of the HP 8901 Modulation Analyzer.
2. The EUT was modulated by an HP 8903 Audio Analyzer and/or internally generated signals.
3. Maximum deviation measurements were recorded for the various configurations.
4. MEASUREMENT RESULTS: ATTACHED SUMMARY FOR DEVIATION

PAGE NO.

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TRANSMITTER TEST SET-UP

TEST A. MODULATION CAPABILITY/DISTORTION  
 TEST B. AUDIO FREQUENCY RESPONSE  
 TEST C. HUM AND NOISE LEVEL  
 TEST D. RESPONSE OF LOW PASS FILTER  
 TEST E. MODULATION LIMITING



Asset	Description	s/n
(1)	<u>Audio Oscillator</u>	
___	i00010 HP 204D	1105A04683
<u>x</u>	i00017 HP 8903A	2216A01753
<u>x</u>	i00118 HP 33120A	US36002064
(2)	<u>COAXIAL ATTENUATOR</u>	
___	i00122 NARDA 766-10	7802
___	i00123 NARDA 766-10	7802A
<u>x</u>	i00113 SIERRA 661A-3D	1059
___	i00069 BIRD 8329 (30 dB)	10066
(3)	<u>MODULATION ANALYZER</u>	
<u>x</u>	i00020 HP 8901A	2105A01087
(4)	<u>AUDIO ANALYZER</u>	
<u>x</u>	i00017 HP 8903A	2216A01753

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MEASUREMENT SUMMARY:      Measurement Of Maximum Deviation

MODULATION	LIMIT, kHz	DEVIATION, KHz
(a) Voice	$\geq 10.8 \text{ \& } \leq 13.2$	10.9
(b) Wideband Data	$\geq 7.2 \text{ \& } \leq 8.8$	8.0
(c) SAT	$\geq 1.8 \text{ \& } \leq 2.2$	2.2
(d) ST	$\geq 7.2 \text{ \& } \leq 8.8$	8.2
(e) SAT + VOICE	N/A	11.4
(f) SAT + DTMF	N/A	12.4
(i) NAMPS VOICE	N/A	N/A
(j) NAMPS DSAT	N/A	N/A
(k) NAMPS ST	N/A	N/A
(l) NAMPS VOICE	N/A	N/A

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NAME OF TEST: Emission Masks (Occupied Bandwidth)

SPECIFICATION: 47 CFR 2.1049(c)(1), 22

GUIDE: As indicated on page 7

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  $\pm 2.5$  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

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MEASUREMENT SUMMARY: Emission Masks (Occupied Bandwidth)

MODULATION	MEASURED DEVIATION ±kHz (HP 8901A)	LIMIT ±kHz	B/W @-26 dB PLOTS, kHz
NONE	0.0	0.0	0.0
VOICE	10.9	$\geq 10.8 \text{ \& } \leq 13.2$	-27
WIDEBAND DATA	8.0	$\geq 7.2 \text{ \& } \leq 8.8$	-23
SAT + VOICE	11.4	N/A	-29
SAT + DTMF	12.4	N/A	-28
CDMA	N/A	N/A	N/A
TDMA	N/A	N/A	N/A
NAMPS	N/A	N/A	N/A

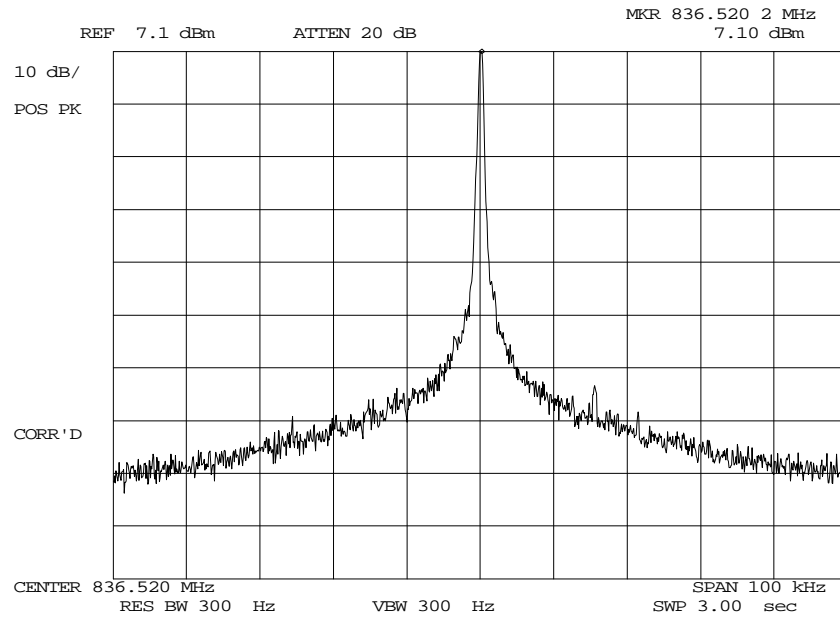
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970401: 1999-Jul-22 Thu 10:44:00  
STATE: 1:Low Power



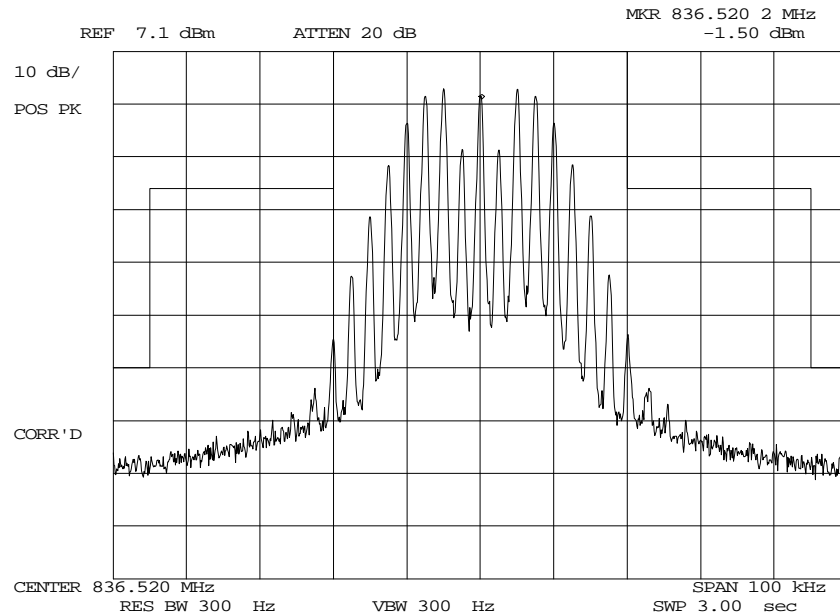
POWER: LOW  
MODULATION: NONE

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9970402: 1999-Jul-22 Thu 11:01:00  
 STATE: 1:Low Power



POWER:  
 MODULATION:

LOW  
 VOICE: 2500 Hz SINE WAVE  
 MASK: AMPS CELLULAR,  
 F3E/F3D w/LPF

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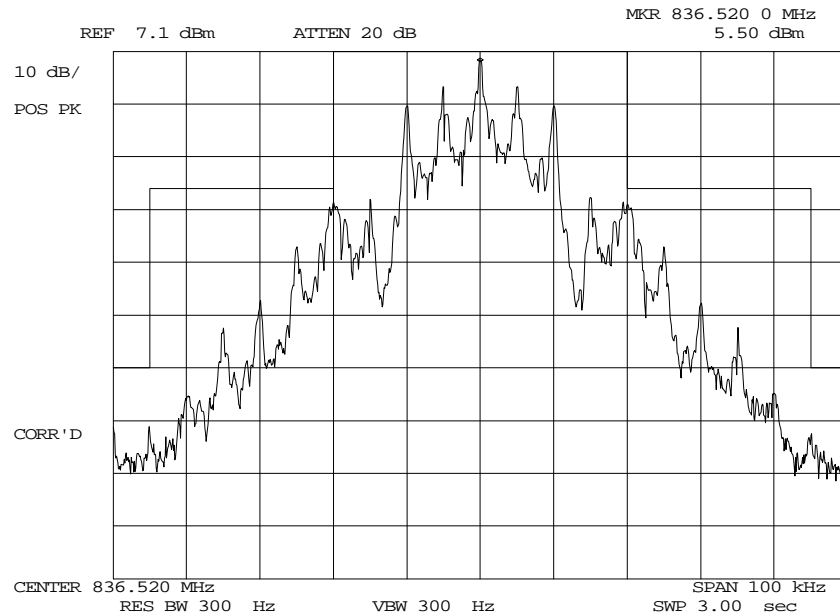
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970404: 1999-Jul-22 Thu 11:07:00  
STATE: 1:Low Power



POWER:  
MODULATION:

LOW  
WBD  
MASK: AMPS CELLULAR,  
F3E/F3D w/LPF

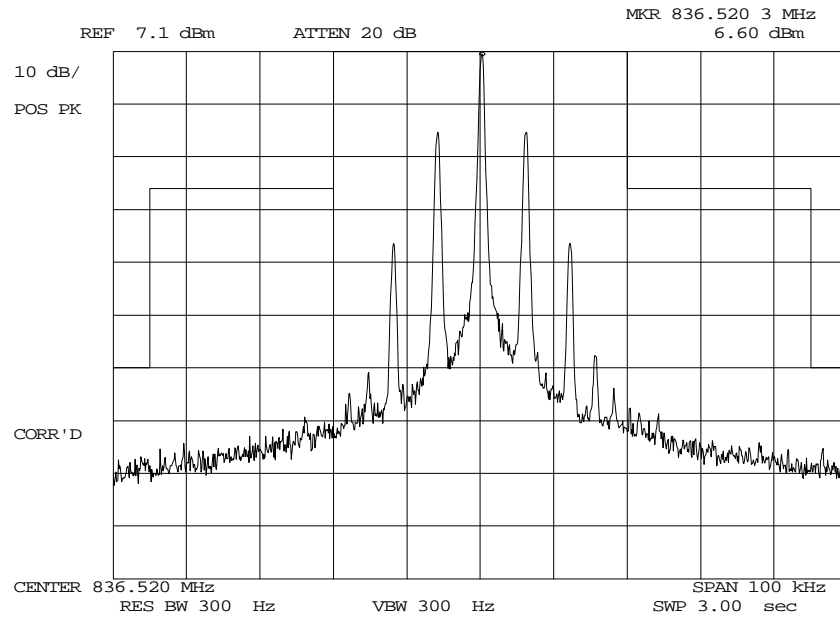
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9970405: 1999-Jul-22 Thu 11:11:00  
 STATE: 1:Low Power



POWER: LOW  
 MODULATION: SAT  
 MASK: AMPS CELLULAR,  
 F3E/F3D w/LPF

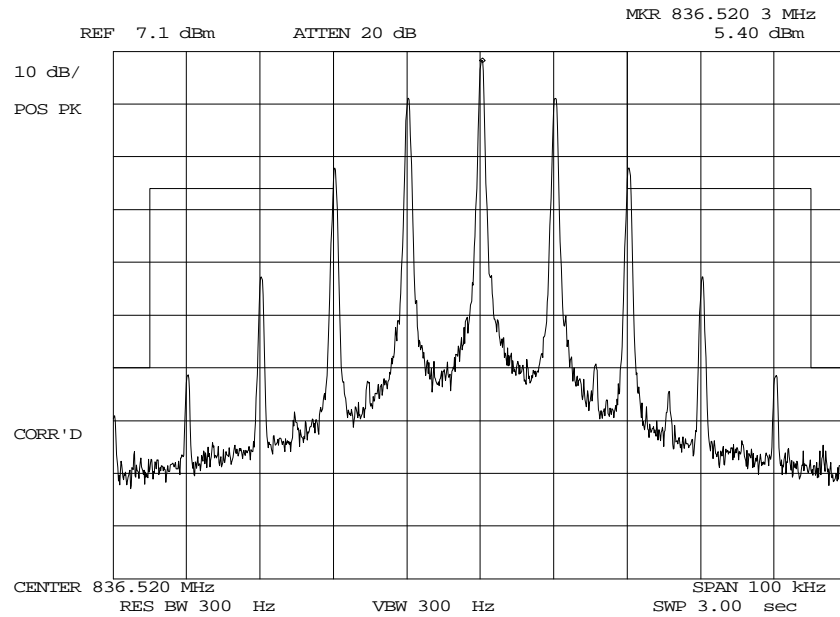
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9970406: 1999-Jul-22 Thu 11:13:00  
 STATE: 1:Low Power



POWER:  
MODULATION:

LOW  
ST  
MASK: AMPS CELLULAR,  
F3E/F3D w/LPF

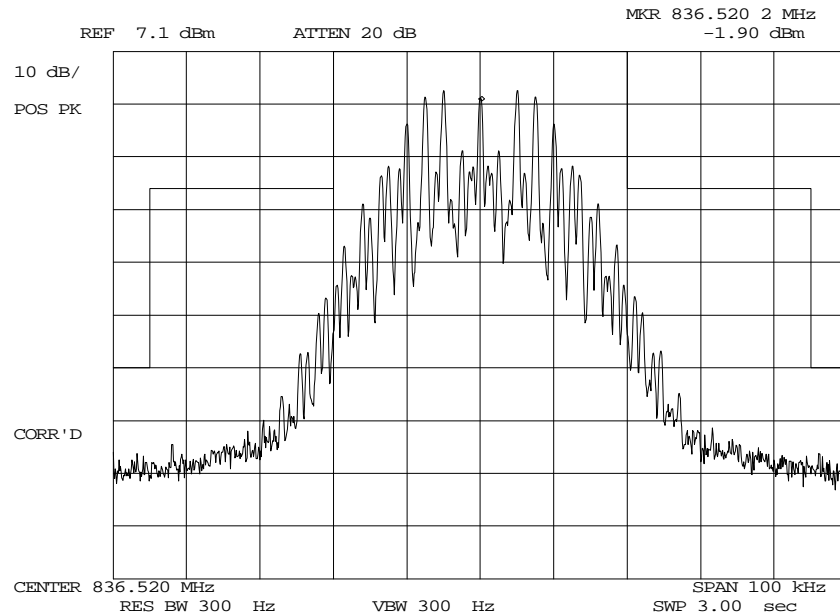
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9970403: 1999-Jul-22 Thu 11:03:00  
 STATE: 1:Low Power



POWER:  
 MODULATION:

LOW  
 SAT+VOICE  
 MASK: AMPS CELLULAR,  
 F3E/F3D w/LPF

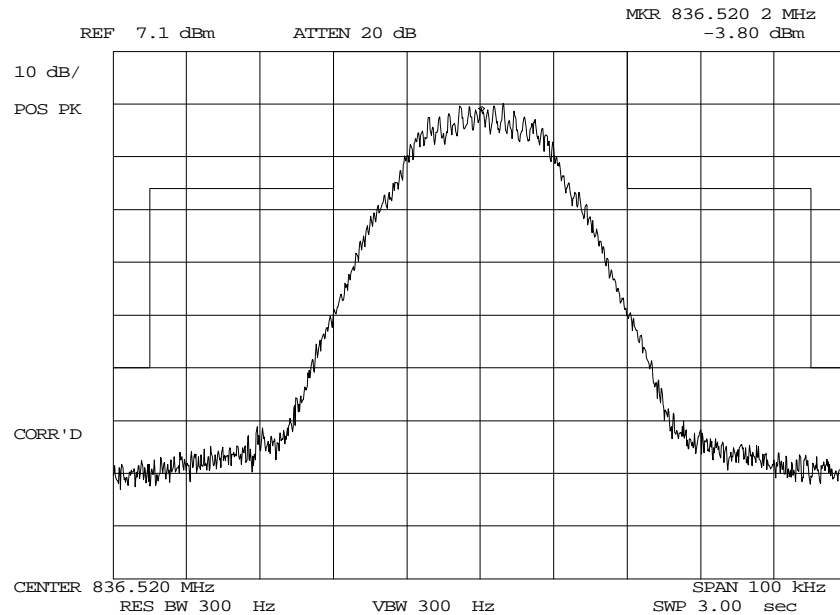
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9970407: 1999-Jul-22 Thu 11:15:00  
 STATE: 1:Low Power



POWER:  
 MODULATION:

LOW  
 SAT+DTMF  
 MASK: AMPS CELLULAR,  
 F3E/F3D w/LPF

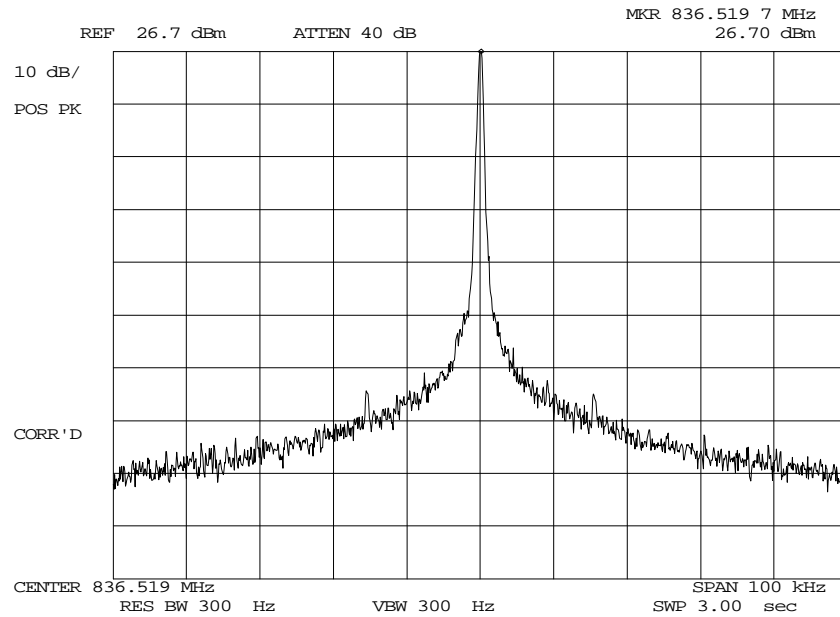
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9960292: 1999-Jun-30 Wed 10:39:00  
STATE: 2:High Power



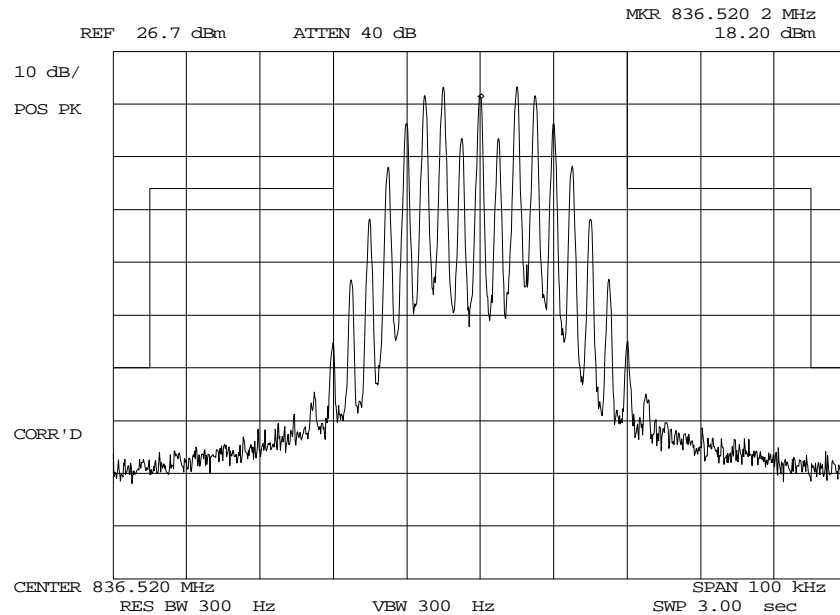
POWER: HIGH  
MODULATION: NONE

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9970408: 1999-Jul-22 Thu 11:36:00  
 STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
VOICE: 2500 Hz SINE WAVE  
MASK: AMPS CELLULAR,  
F3E/F3D w/LPF

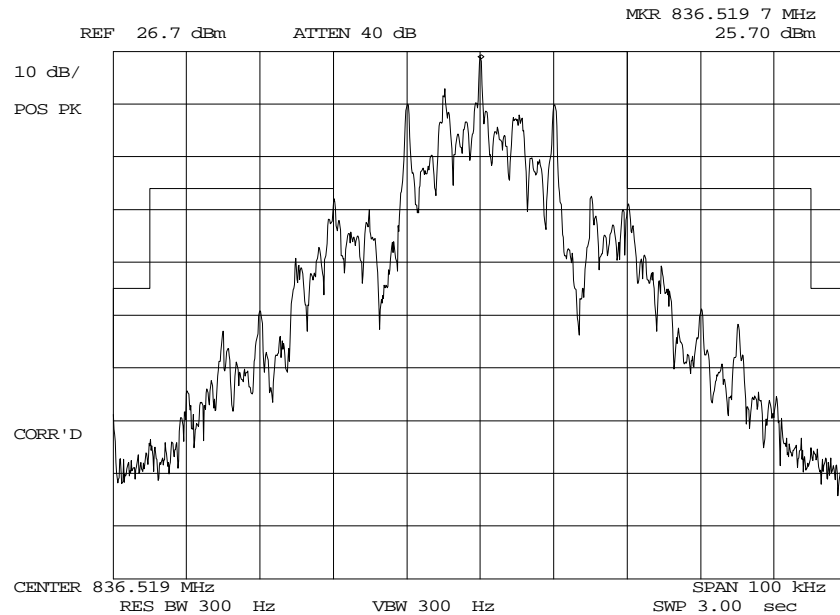
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9960304: 1999-Jun-30 Wed 11:58:00  
STATE: 2:High Power



POWER:  
MODULATION:

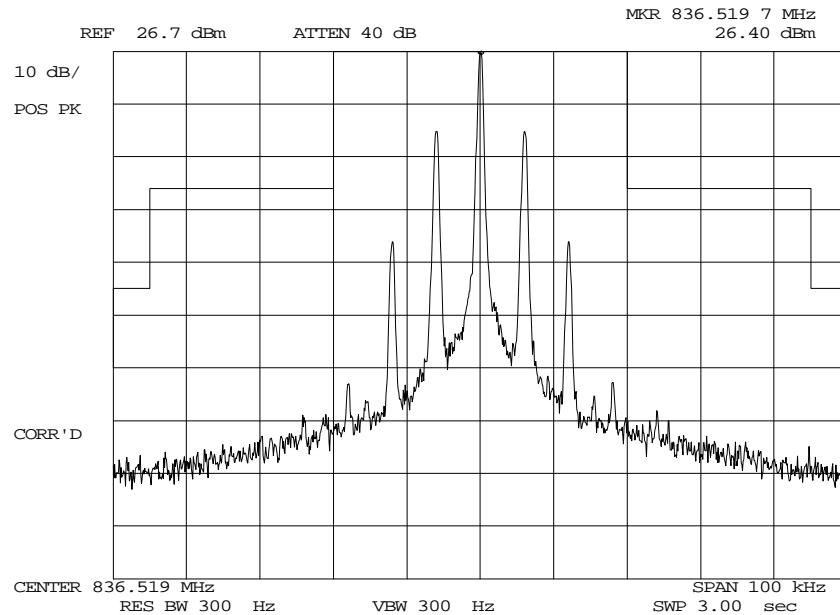
HIGH  
WBD  
MASK: AMPS CELLULAR, F1D,  
DATA

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9960299: 1999-Jun-30 Wed 11:34:00  
 STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
SAT  
MASK: AMPS CELLULAR, F1D,  
DATA

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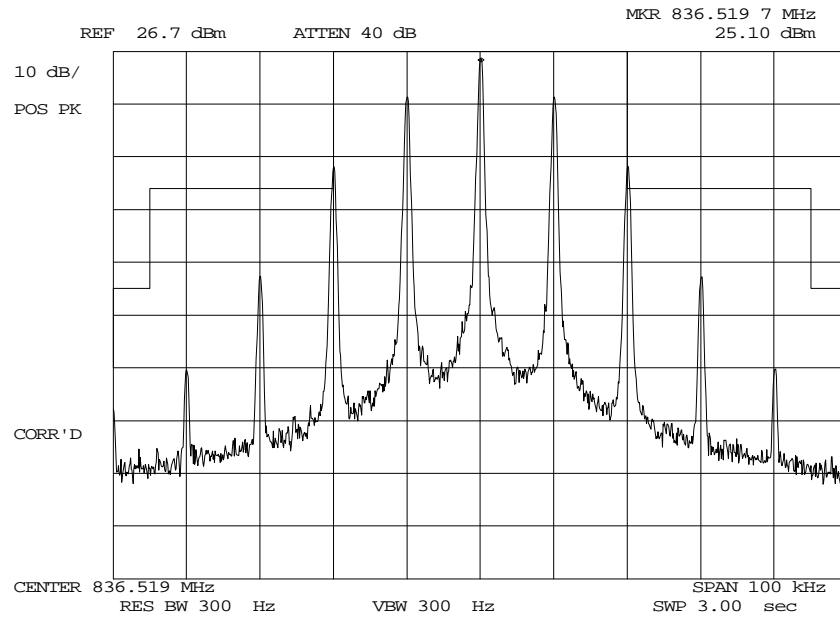
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9960302: 1999-Jun-30 Wed 11:46:00  
STATE: 2:High Power



POWER:  
MODULATION:

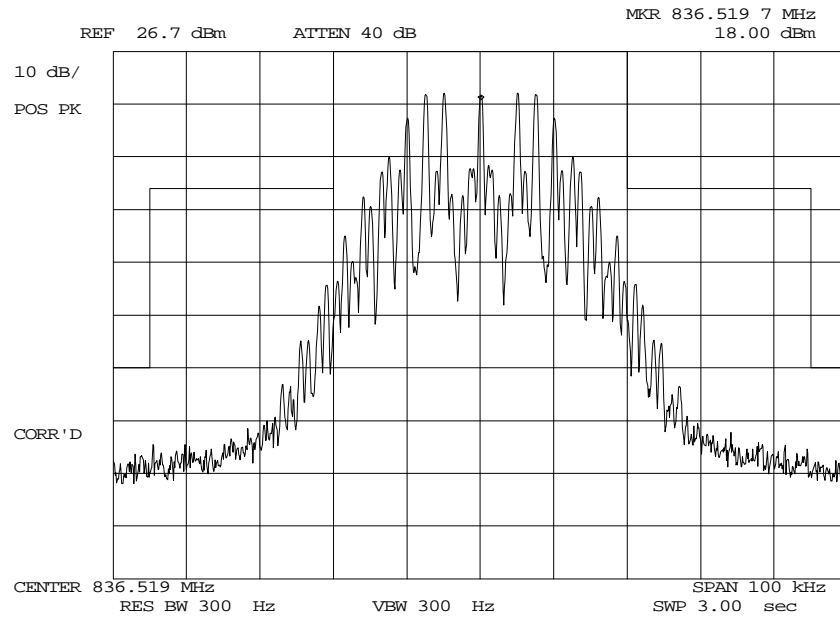
HIGH  
ST  
MASK: AMPS CELLULAR, F1D,  
DATA

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9960296: 1999-Jun-30 Wed 11:24:00  
 STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
SAT+VOICE  
MASK: AMPS CELLULAR,  
F3E/F3D w/LPF

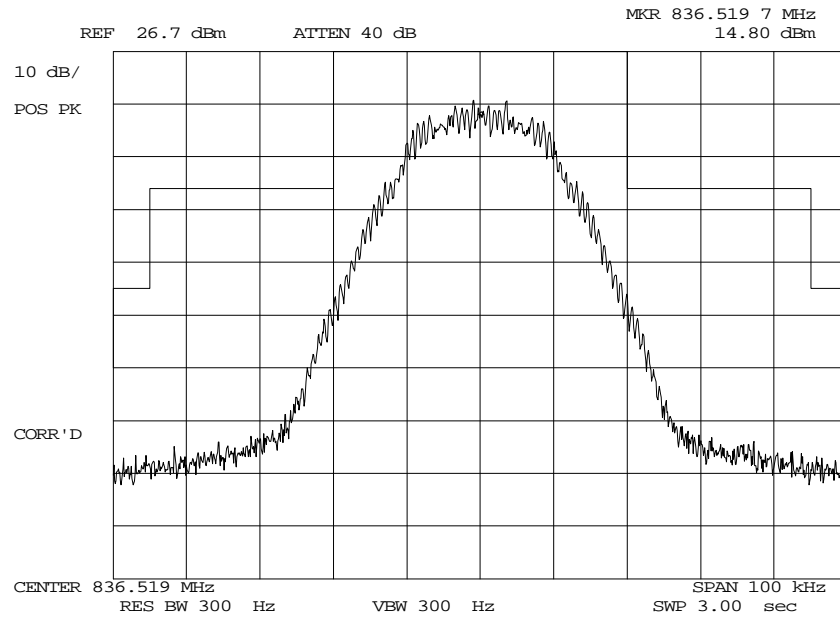
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9960300: 1999-Jun-30 Wed 11:40:00  
 STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
SAT+DTMF  
MASK: AMPS CELLULAR, F1D,  
DATA

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NAME OF TEST: Emission Requirements -  
Worst Case Modulation & Wideband Data

SPECIFICATION: 47 CFR 22.917

GUIDE: As indicated on page 7

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT was connected to a coaxial attenuator and then to a spectrum analyzer. The unmodulated carrier was set for 0 dB reference level.
2. A notch filter was introduced to reduce or eliminate any spectrum analyzer internally generated spurious for measurements of the harmonics and the carrier level.
3. Spectrum analyzer bandwidth was set to section 22.917(h) as applicable.
4. Measurements were made on channels 380, 799 and 991. The equipment was first modulated for the Worst Case Modulation, then for Wideband Data (F8W, F1D).
5. All other spurious emissions over the range of 0 the beyond the 10<sup>th</sup> harmonic (10 GHz) were 20 dB or more below the limit
6. The data presented here is for the Worst Case.
7. MEASUREMENT RESULTS: ATTACHED

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MEASUREMENT SUMMARY: Emission Requirements -  
Worst Case Modulation

WORST CASE MODULATION = VOICE +\_SAT

EMISSION, MHz/HARM.	LIMIT, dBc	SPURIOUS EMISSIONS, dBc	
		Lo	Hi
F0 + 20 kHz to F0 + 45 kHz	$\leq -26$	$\leq -45.0$	$\leq -46.0$
F0 + 45 kHz to 2 <sup>nd</sup> Harmonic	$\leq -60$ or $43 + 10 \log P$	$\leq -77.0$	$\leq -79.0$
2 <sup>nd</sup> to 10 <sup>th</sup>	$(\leq -13 \text{ dBm})$	$\leq -70.8$	$\leq -72.8$

MEASUREMENT RESULTS = ATTACHED OFFSET PLOTS

## EMISSION IN THE RECEIVER CRITICAL BAND

EMISSION, MHz/HARM.	LIMIT, dBm	SPURIOUS EMISSIONS, dBm	
		Lo	Hi
869 to 894	$\leq -80$	$\leq -83.2$	$\leq -83.3$

MEASUREMENT RESULTS = ATTACHED PLOTS

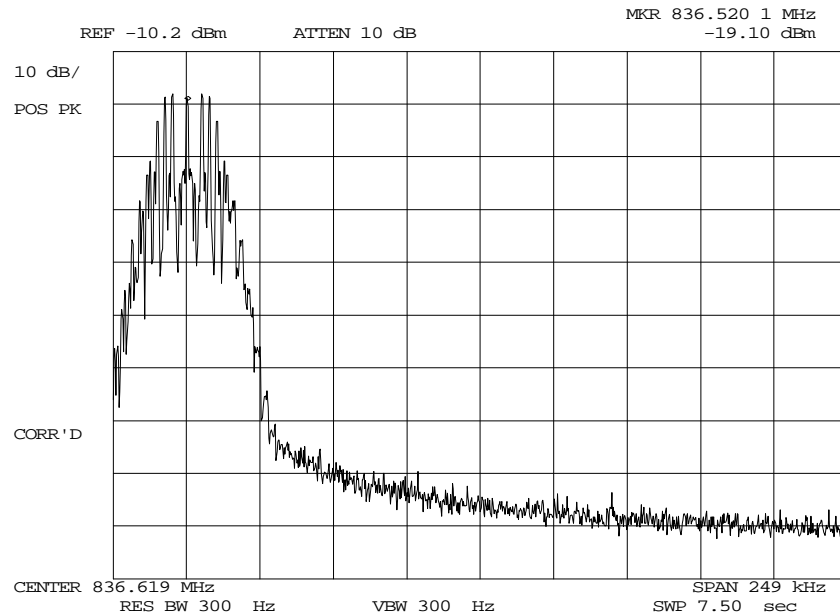
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9970032: 1999-Jul-01 Thu 10:41:00  
STATE: 1:Low Power



POWER:  
MODULATION:

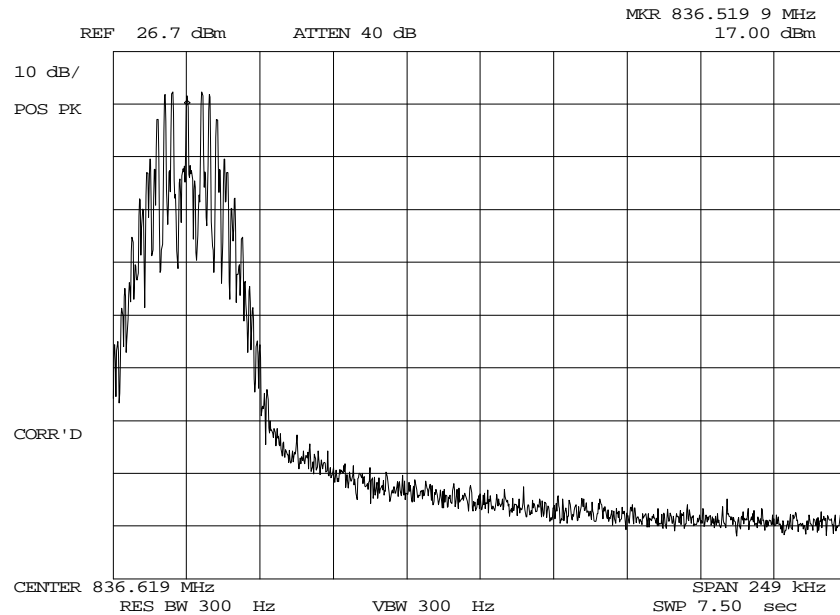
LOW  
SAT+VOICE  
OFFSET OCCUPIED BANDWIDTH

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9970031: 1999-Jul-01 Thu 10:39:00  
 STATE: 2:High Power



POWER: HIGH  
 MODULATION: SAT+VOICE  
 OFFSET OCCUPIED BANDWIDTH

SUPERVISED BY:

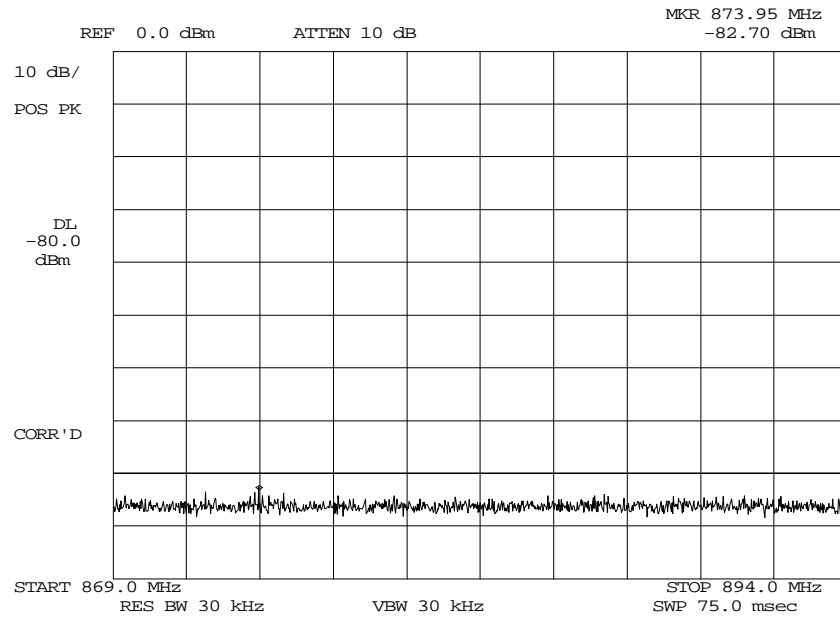
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9960313: 1999-Jun-30 Wed 14:07:00  
 STATE: 1:Low Power



POWER:

LOW

MODULATION:

ANY

TX SPURS IN RX CRITICAL  
 BAND

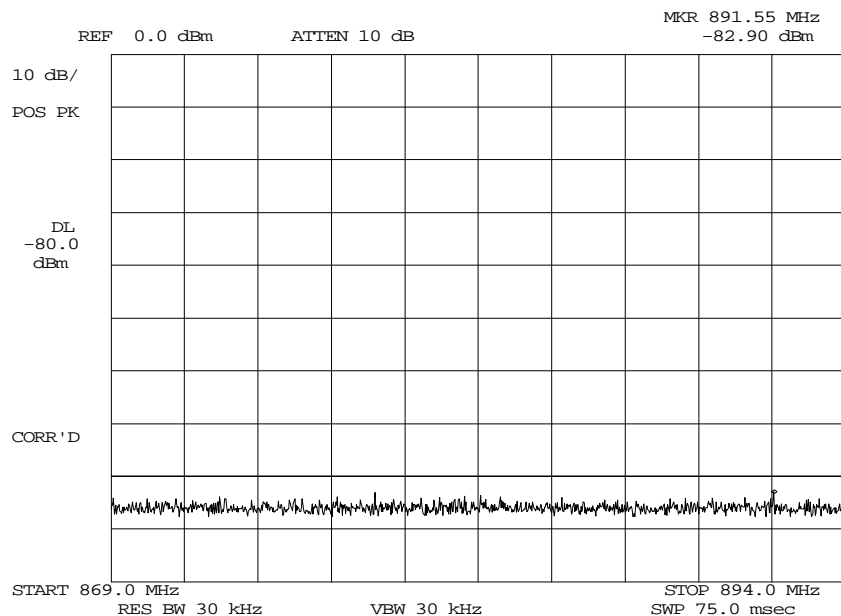
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9960314: 1999-Jun-30 Wed 14:09:00  
 STATE: 2:High Power



POWER: HIGH  
 MODULATION: ANY  
 TX SPURS IN RX CRITICAL  
 BAND

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MEASUREMENT SUMMARY: Emission Requirements -  
Wideband Data (F1D, 10 kb/s)

EMISSION, MHz/HARM.	LIMIT, dBc	SPURIOUS EMISSIONS, dBc	
		Lo	Hi
F0 + 20 kHz to F0 + 45 kHz	≤-26	≤-38.0	≤-38.0
F0 + 45 kHz to F0 + 90 kHz	≤-45	≤-70.0	≤-70.0
F0 + 90 kHz to 2 <sup>nd</sup> Harmonic	≤-60 (≤-13 dBm)	≤-53.4	≤-58.2
2 <sup>nd</sup> to 10 <sup>th</sup>	(≤-13 dBm)	≤-70.8	≤-72.2

MEASUREMENT RESULTS = ATTACHED OFFSET PLOTS

## EMISSION IN THE RECEIVER CRITICAL BAND

EMISSION, MHz/HARM.	LIMIT, dBm	SPURIOUS EMISSIONS, dBm	
		Lo	Hi
869 to 894	≤-80	≤-83.2	≤-83.3

MEASUREMENT RESULTS = ATTACHED PLOTS

SUPERVISED BY:

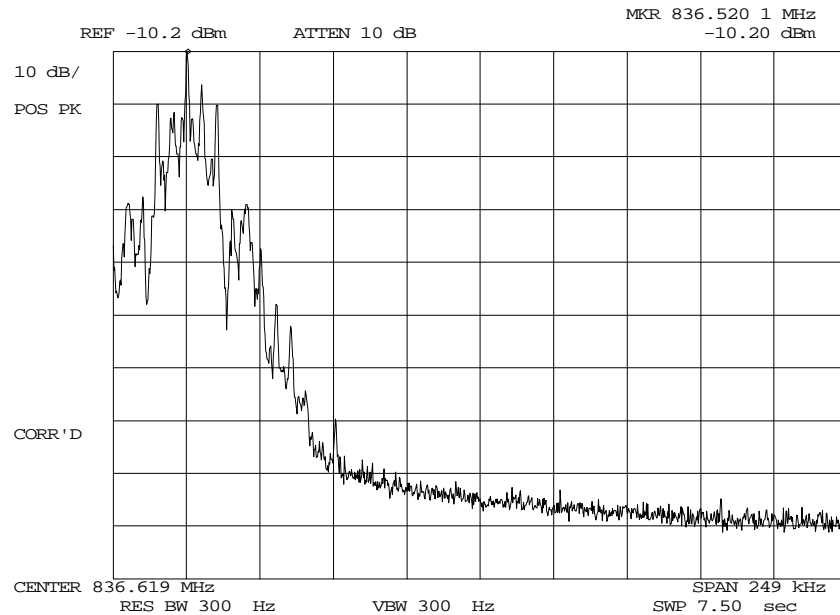


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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9960320: 1999-Jun-30 Wed 15:00:00  
 STATE: 1:Low Power



POWER:  
 MODULATION:

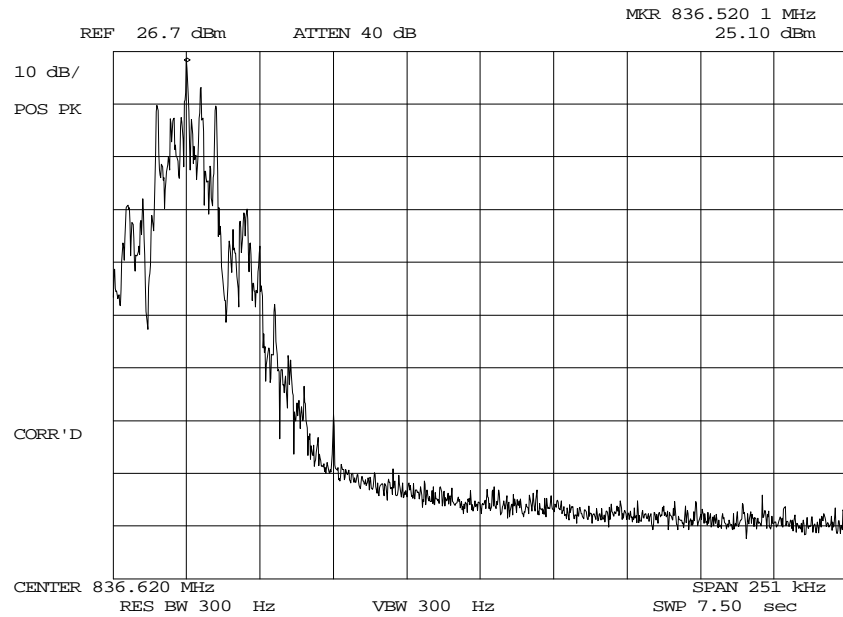
LOW  
 WBD  
 OFFSET OCCUPIED BANDWIDTH

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9960319: 1999-Jun-30 Wed 14:57:00  
 STATE: 2:High Power



POWER: HIGH  
 MODULATION: WBD  
 OFFSET OCCUPIED BANDWIDTH

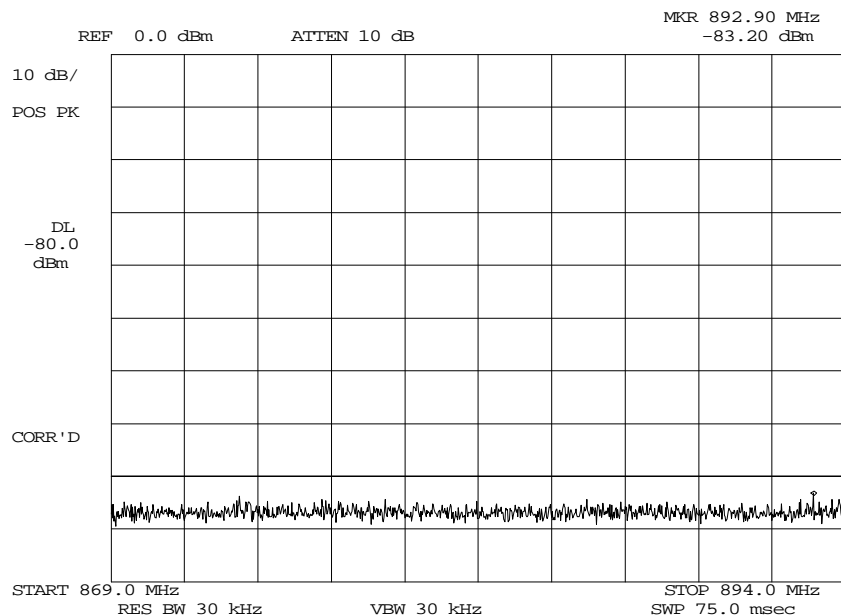
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
 g9960322: 1999-Jun-30 Wed 15:08:00  
 STATE: 1:Low Power



POWER:

MODULATION:

LOW

ANY

TX SPURS IN RX CRITICAL  
 BAND

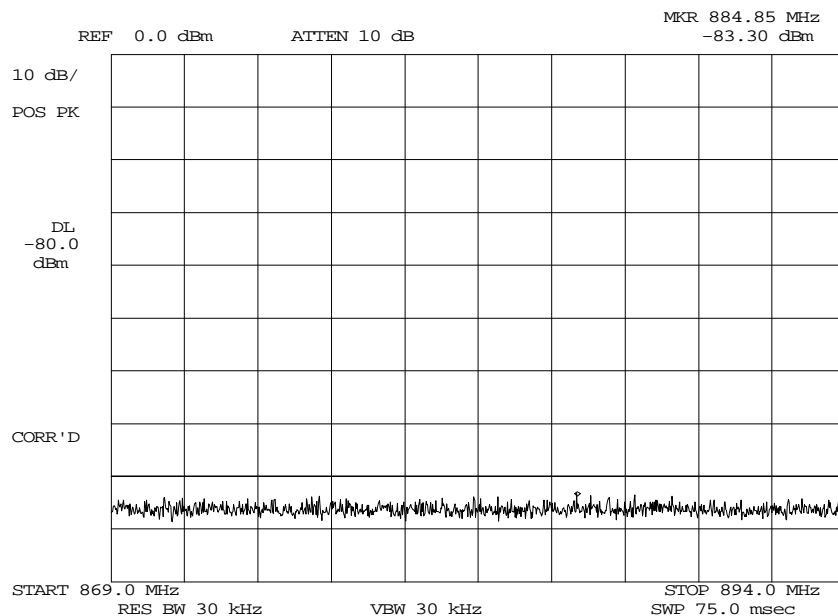
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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9960321: 1999-Jun-30 Wed 15:07:00  
STATE: 2:High Power



POWER: HIGH  
MODULATION: ANY  
TX SPURS IN RX CRITICAL  
BAND

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NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

GUIDE: As indicated on page 7

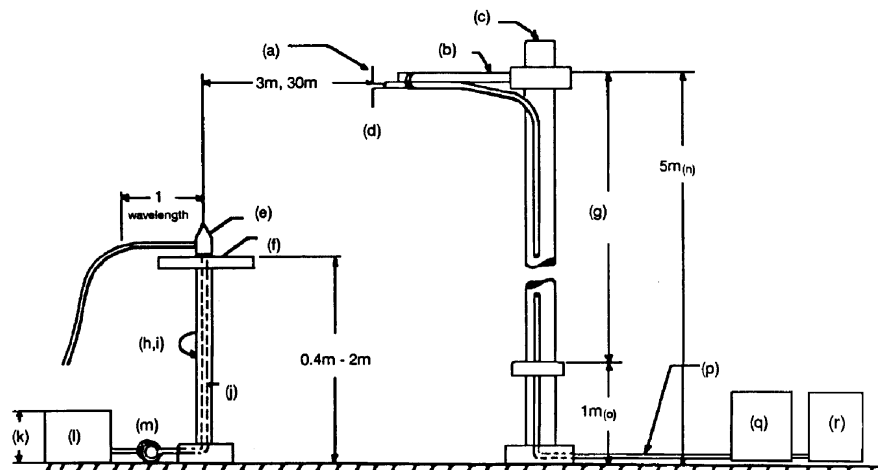
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. A description of the measurement facilities was filed with the FCC and was found to be in compliance with the requirements of Section 15.38, by letter from the FCC dated March 3, 1997, FILE 31040/SIT. All pertinent changes will be reported to the Commission by up-date prior to March 2000.
2. At first, in order to locate all spurious frequencies and approximate amplitudes, and to determine proper equipment functioning, the test sample was set up at a distance of three meters from the test instrument. Valid spurious signals were determined by switching the power on and off.
3. In the field, the test sample was placed on a wooden turntable above ground at three (or thirty) meters away from the search antenna. Excess power leads were coiled near the power supply.  
  
The cables were oriented in order to obtain the maximum response. At each emission frequency, the turntable was rotated and the search antennas were raised and lowered vertically.
4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.
6. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.
7. The worst case for all channels is shown.
8. Measurement results: ATTACHED FOR WORST CASE

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RADIATED TEST SETUP

## NOTES:

- (a) Search Antenna - Rotatable on boom  
 (b) Non-metallic boom  
 (c) Non-metallic mast  
 (d) Adjustable horizontally  
 (e) Equipment Under Test  
 (f) Turntable  
 (g) Boom adjustable in height.  
 (h) External control cables routed horizontally at least one wavelength.  
 (i) Rotatable  
 (j) Cables routed through hollow turntable center  
 (k) 30 cm or less  
 (l) External power source  
 (m) 10 cm diameter coil of excess cable  
 (n) 25 cm (V), 1 m-7 m (V, H)  
 (o) 25 cm from bottom end of 'V', 1m normally  
 (p) Calibrated Cable at least 10m in length  
 (q) Amplifier (optional)  
 (r) Spectrum Analyzer

Asset	Description	s/n	Cycle	Last Cal
-------	-------------	-----	-------	----------

Per ANSI C63.4-1992, 10.1.4

TRANSDUCER

___	i00065	EMCO 3109B 100Hz-50MHz	2336	12 mo.	
___	i00033	Singer 94593-1 10kHz-32MHz	0219	12 mo.	
x	i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Oct-98
x	i00089	Aprcl 2001 200MHz-1GHz	001500	12 mo.	Oct-98
x	i00103	EMCO 3115 1GHz-18GHz	9208-3925	12 mo.	Oct-98
___	i00085	EMCO 3116 10GHz-40GHz	2076	12 mo.	

AMPLIFIER

___	i00028	HP 8449A	2749A00121	12 mo.	Mar-99
-----	--------	----------	------------	--------	--------

SPECTRUM ANALYZER

___	i00029	HP 8563E	3213A00104	12 mo.	Aug-99
x	i00033	HP 85462A	3625A00357	12 mo.	May-99
___	i00048	HP 8566B	2511AD1467	6 mo.	May-99



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MEASUREMENT RESULTS: FIELD STRENGTH OF SPURIOUS RADIATION

Measurement Distance, m = 3

Spectrum Searched, GHz = 0 to 10

TUNED, MHz	CHANNEL NUMBER	EMISSION MHz/HARM.	LEVEL, dBc Hi
824.040	991	2 <sup>nd</sup> - 10 <sup>th</sup>	-63
836.400	380	2 <sup>nd</sup> - 10 <sup>th</sup>	-59
848.970	799	2 <sup>nd</sup> - 10 <sup>th</sup>	-63

NOTE:

For channels 380, 799 and 991, the field strength of spurious radiation over the above noted range measured 20 dB or more below the limit.

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NAME OF TEST: Field Strength of Spurious Radiation  
 g9960310: 1999-Jun-30 Wed 11:42:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	ERP, dBm	MARGIN, dB
824.040000	1648.072000	20.95	38.1	-38.35	-25.4
836.400000	1672.792000	21.08	38.33	-37.95	-25
848.970000	1697.932500	12.28	38.57	-46.55	-33.6
824.040000	2472.118700	13.63	44.98	-38.75	-25.8
836.400000	2509.198450	11.69	45.18	-40.55	-27.5
848.970000	2546.909750	2.28	45.4	-49.65	-36.7
824.040000	3296.159732	50.17	4.02	-43.15	-30.2
836.400000	3345.599367	52	4.16	-41.25	-28.2
848.970000	3395.879599	51.83	4.31	-41.25	-28.3
824.040000	4120.200265	51.67	6.14	-39.55	-26.6
836.400000	4181.999967	56.33	6.26	-34.75	-21.8
848.970000	4244.850865	53.17	6.38	-37.85	-24.9
824.040000	4944.240499	41.5	7.62	-48.25	-35.3
836.400000	5018.400633	41.83	7.74	-47.85	-34.8
848.970000	5093.820665	39.83	7.89	-49.65	-36.7
824.040000	5768.279531	8.5	9.19	-79.65	-66.7
836.400000	5854.799567	1.5	9.35	-86.55	-73.6
848.970000	5942.789398	-3	9.5	-90.85	-77.9
824.040000	6592.319464	5.67	11.49	-80.25	-67.2
836.400000	6691.199367	8.5	11.79	-77.05	-64.1
848.970000	6791.759331	4.33	12.09	-80.95	-68
824.040000	7416.359397	6.17	12.56	-78.65	-65.7
836.400000	7527.599167	-3	12.52	-87.85	-74.9
848.970000	7640.729264	6.17	12.48	-78.75	-65.8
824.040000	8240.399330	-2.83	12.4	-87.85	-74.8
836.400000	8363.998967	8.67	12.42	-76.25	-63.3
848.970000	8489.699197	10.33	12.44	-74.65	-61.6

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NAME OF TEST: Frequency Stability (Temperature Variation)

SPECIFICATION: 47 CFR 2.1055(a)(1)

GUIDE: As indicated on page 7

TEST CONDITIONS: As Indicated

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

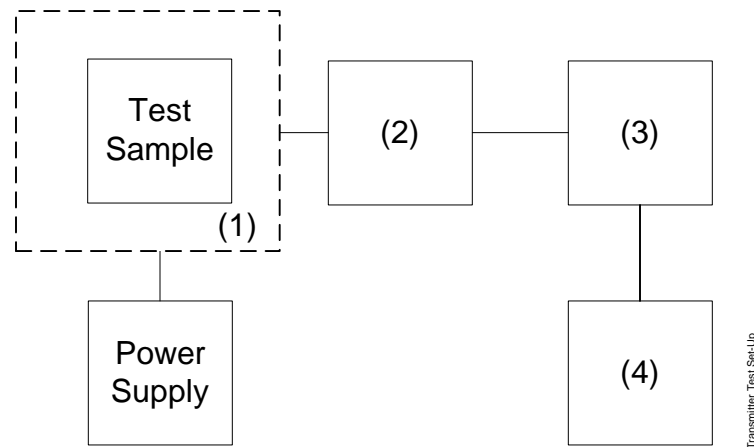
1. The EUT and test equipment were set up as shown on the following page.
2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
3. With power OFF, the temperature 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.
4. The temperature tests were performed for the worst case.
5. MEASUREMENT RESULTS: ATTACHED

PAGE NO.

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TRANSMITTER TEST SET-UP

TEST A. OPERATIONAL STABILITY  
 TEST B. CARRIER FREQUENCY STABILITY  
 TEST C. OPERATIONAL PERFORMANCE STABILITY  
 TEST D. HUMIDITY  
 TEST E. VIBRATION  
 TEST F. ENVIRONMENTAL TEMPERATURE  
 TEST G. FREQUENCY STABILITY: TEMPERATURE VARIATION  
 TEST H. FREQUENCY STABILITY: VOLTAGE VARIATION

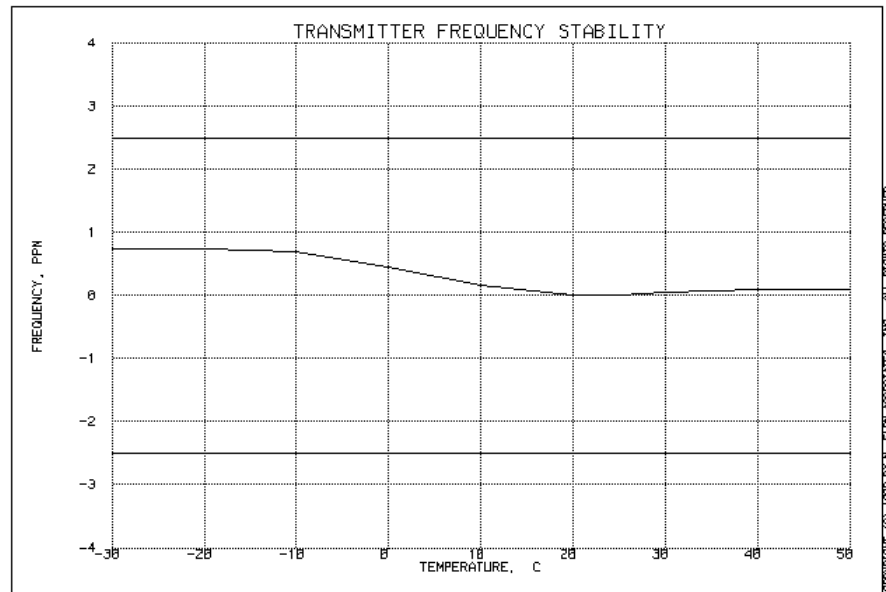


	Asset	Description	s/n
(1)	<u>TEMPERATURE, HUMIDITY, VIBRATION</u>		
<u>x</u>	i00027	Tenny Temp. Chamber	9083-765-234
<u>   </u>	i00	Weber Humidity Chamber	
<u>   </u>	i00	L.A.B. RVH 18-100	
(2)	<u>COAXIAL ATTENUATOR</u>		
<u>x</u>	i00122	NARDA 766-10	7802
<u>   </u>	i00123	NARDA 766-10	7802A
<u>   </u>	i00113	SIERRA 661A-3D	1059
<u>   </u>	i00069	BIRD 8329 (30 dB)	10066
(3)	<u>R.F. POWER</u>		
<u>   </u>	i00014	HP 435A POWER METER	1733A05839
<u>x</u>	i00039	HP 436A POWER METER	2709A26776
<u>x</u>	i00020	HP 8901A POWER MODE	2105A01087
(4)	<u>FREQUENCY COUNTER</u>		
<u>   </u>	i00042	HP 5383A	1628A00959
<u>x</u>	i00019	HP 5334B	2704A00347
<u>x</u>	i00020	HP 8901A	2105A01087

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NAME OF TEST: Frequency Stability (Temperature Variation)  
g9970014: 1999-Jul-02 Fri 09:03:00  
STATE: 0:General



SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 57 of 57.

NAME OF TEST: Frequency Stability (Voltage Variation)

SPECIFICATION: 47 CFR 2.1055 (b)(1)

GUIDE: As indicated on page 7

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT was placed in a temperature chamber at  $25 \pm 5^{\circ}\text{C}$  and connected as for "Frequency Stability - Temperature Variation" test.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case. Use 'best' data only.');

RESULTS: Frequency Stability (Voltage Variation)

g9960289: 1999-Jun-30 Wed 09:36:49

STATE: 0:General

LIMIT, ppm = 2.5  
 LIMIT, Hz = 2091  
 BATTERY END POINT (Voltage) = 3.6

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	3.57	836.520000	0	0.00
100	4.2	836.520000	0	0.00
115	4.83	836.519980	-20	-0.02
86	3.6	836.520010	10	0.01



SUPERVISED BY:

Morton Flom, P. Eng.

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:

A handwritten signature in black ink, reading "M. Flom P. Eng." with a stylized, cursive script.

Morton Flom, P. Eng.