MFA M. Flom Associates, Inc. - Global Compliance Center
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85224-1571
www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

Date: May 4, 1999

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

Attention: Authorization & Evaluation Division

Applicant: Nokia Mobile Phones
Equipment: 7160, Type NSW-5NX
FCC ID: LJPNSW-5NX
FCC Rules: 22, 24, 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,

Morton Flom, P. Eng.

enclosure(s)
CERTIFIED MAIL, R.R.R.

cc: Applicant
MF/cvr

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

APPLICANT: Nokia Mobile Phones

FCC ID: LJPNSW-5NX

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) INSTALLATION/OPERATING MANUAL
   (9) TUNE-UP/ALIGNMENT PROCEDURE
   (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

MFA M. Flom Associates, Inc. - Global Compliance Center
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85224-1571
www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

Sub-part
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: LJPNSW-5NX

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

May 4, 1999

SUPERVISED BY: 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.

TABLE OF CONTENTS

PAGE NO. 1 of 71.

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 85224

c) Report Number: d9940009

d) Client: Nokia Mobile Phones
Elektroniikkatie 10
Fin-90570
Oulu, Finland

e) Identification: 7160, Type NSW-5NX
FCC ID: LJPNSW-5NX
Description: Dual Band, Tri-Mode Cellular Telephone

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

g) Report Date: May 4, 1999
EUT Received: March 22, 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 71.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

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

22, 24, Confidentiality

Sub-part 2.1033

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

Nokia Mobile Phones
Elektroniikkatie 10
Fin-90570
Oulu, Finland

MANUFACTURER:

Nokia Manufacturing Inc U.S.A.
4201 Diplomacy Road
Centreport 2
Fort Worth, TX 76155

(c)(2): FCC ID: LJPNSW-5NX

MODEL NO: 7160, Type NSW-5NX

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

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION:
AMPS-FM: 40K0F8W
40K0F1D
AMPS-TDMA: 30K0DXW
PCS-TDMA: 30K0DXW

(c)(5): FREQUENCY RANGE, MHz:
AMPS-FM: 824.04 to 848.97
AMPS-TDMA: 824.04 to 848.97
PCS-TDMA:
1850.04 to 1909.92

(c)(6): POWER RATING, Watts:
AMPS-FM: 0.4 ERP
AMPS-TDMA: 0.64 ERP
PCS-TDMA: 0.7 EIRP

___ Switchable x Variable ___ N/A

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

PAGE NO. 3 of 71.

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 = 3.9

(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

Accessories Used During Testing:

Desktop Stand	Model: DCH-9
Performance Travel Charger	ACP-8U
Travel Charger	ACP-7U
Headset with Remote Control	HDC-9P
Data Cable for Internal Data	DLR-3
Batteries	BLS-2S

PAGE NO. 4 of 71.

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
_x_ 22 – Public Mobile Services
____ 22 Subpart H - Cellular Radiotelephone Service
____ 22.901(d) - Alternative technologies and auxiliary services
____ 23 – International Fixed Public Radiocommunication services
_x_ 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)
____ 101 – Fixed Microwave Services

PAGE NO. 5 of 71.

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:
   - [x] (a) VOICE
   - [x] (b) WIDEBAND DATA
   - [x] (c) SAT
   - [x] (d) ST
   - [x] (e) SAT + VOICE
   - [x] (f) SAT + DTMF
   - [ ] (g) CDMA
   - [x] (h) TDMA
   - [ ] (i) NAMPS VOICE
   - [ ] (j) NAMPS DSAT
   - [ ] (k) NAMPS ST
   - [ ] (l) NAMPS VOICE + DSAT

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.

PAGE NO. 7 of 71.

NAME OF TEST: Carrier Output Power (Conducted)

SPECIFICATION: 47 CFR 2.1046(a)

GUIDE: TIA/EIA/IS-137-A-1996

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 ±3%.

MEASUREMENT RESULTS

NOMINAL, MHz	CHANNEL	R. F. POWER, WATTS Lo	Hi
AMPS-FM:			
824.040	991	0.008	0.35
836.400	380	0.008	0.35
848.970	799	0.006	0.35
AMPS-TDMA:			
824.040	991	0.0009	0.46
836.400	380	0.0007	0.50
848.970	799	0.0010	0.47
PCS-TDMA:			
1850.04	2	0.0006	0.36
1879.98	1000	0.0005	0.35
1909.92	1998	0.0005	0.38

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 8 of 71.

NAME OF TEST: R. F. Power Output (Radiated)

SPECIFICATION: 47 CFR 2.1046(a)

GUIDE: TIA/EIA/IS-137-A-1996

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 ±1.5 dB.

MEASUREMENT RESULTS

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	uV/m @ 3m	ERP, dBm	ERP, Watts
STATE: 1:Low Power AMPS MODE g9930285: 1999-Mar-25 Thu 10:57:00						
824.040000	824.040000	79.01	25.95	177010.9	7.55	0.008
836.400000	836.400000	80.8	25.94	217270.12	9.35	0.008
848.970000	848.968000	78.36	25.93	163870.21	6.95	0.006
STATE: 2:High Power AMPS MODE g9930284: 1999-Mar-25 Thu 10:53:00						
824.040000	824.040000	96.92	25.95	1391553.79	25.45	0.35
836.400000	836.398000	97.34	25.94	1458814.26	25.95	0.36
848.970000	848.970000	96.00	25.93	1248820.44	24.55	0.36
STATE: 1:Low Power AMPS-TDMA g9930289: 1999-Mar-25 Thu 15:35:00						
824.040000	824.035000	69.48	25.95	59088.1	-1.95	0.0009
836.400000	836.403000	72.51	25.94	83656.56	1.05	0.0008
848.970000	848.958000	70.29	25.93	64714.26	-1.15	0.001
STATE: 2:High Power AMPS-TDMA g9930288: 1999-Mar-25 Thu 15:07:00						
824.040000	824.050000	99.18	25.95	1805094.74	27.75	0.46
836.400000	836.400000	99.46	25.94	1862087.14	28.05	0.50
848.970000	848.985000	98.59	25.93	1682674.06	27.15	0.47

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	uV/m @ 3m	EIRP, dBm	EIRP, Watts
STATE: 1:Low Power PCS-TDMA g9930287: 1999-Mar-25 Thu 13:52:00						
1850.040000	1850.028000	63.91	31.67	60117.37	-0.4	0.0009
1879.980000	1879.973000	63.31	31.24	53394.93	-0.7	0.0009
1909.920000	1909.923000	60.39	31.25	38194.43	-3.6	0.0004
STATE: 2:High Power PCS-TDMA g9930286: 1999-Mar-25 Thu 13:18:00						
1850.040000	1850.043000	92.09	31.67	1541700.45	28.5	0.70
1879.980000	1879.988000	91.54	31.24	1377209.47	27.6	0.58
1909.920000	1909.920000	91.01	31.25	1297179.27	27.0	0.50

PAGE NO. 9 of 71.

TRANSMITTER RADIATED MEASUREMENTS

TEST SAMPLE (1) (2) (3) (4)

3m

	Asset	Description	s/n
(1) TRANSDUCER			
x	i00091	Emco 3115	001469
x	i00089	Aprel Log Periodic	001500
(2) HIGH PASS FILTER			
x	i00	Narda µPAD (In-Band Only)	
x	i00	Trilithic (Out-Of-Band Only)	
(3) PREAMP			
x	i00028	HP 8449 (+30 dB)	2749A00121
(4) SPECTRUM ANALYZER			
x	i00048	HP 8566B	2511A01467
	i00043	HP 8558B	2004A02076
	i00057	HP 8557A	1531A00191
x	i00029	HP 8563E	3213A00104

PAGE NO. 10 of 71.

NAME OF TEST: Audio Frequency Response

SPECIFICATION: 47 CFR 2.1047(a)

GUIDE: TIA/EIA/IS-137-A-1996

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.

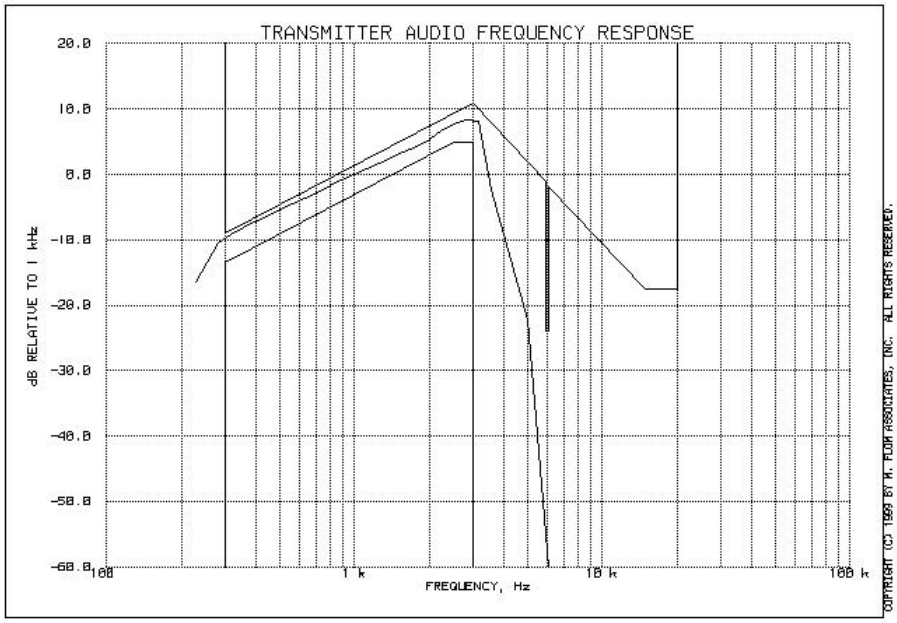
4. With input levels held constant and below limiting at all frequencies, the audio signal generator was varied from 100 Hz to 50 kHz.

5. The response in dB relative to 1 kHz was then measured, using the HP 8901A Modulation Analyzer.

6. MEASUREMENT RESULTS: ATTACHED

PAGE NO. 11 of 71.

NAME OF TEST: Audio Frequency Response
g9930165: 1999-Mar-30 Tue 13:27:00
STATE: 0:General



Additional points:

FREQUENCY, Hz	LEVEL, dB
300	-9.79
20000	-22.55
30000	-22.36
50000	-22.51

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 12 of 71.

NAME OF TEST: Audio Low Pass Filter (Voice Input)

SPECIFICATION: 47 CFR 2.1047(a)

GUIDE: TIA/EIA/IS-137-A-1996

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. 13 of 71.

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

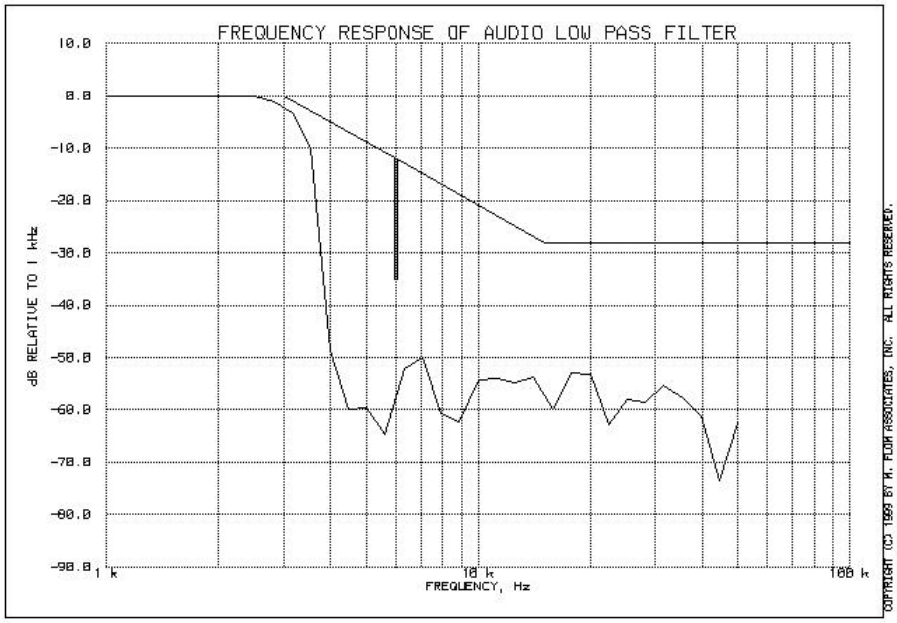
---

(1)	TEST SAMPLE	(2)	(3)
POWER SUPPLY		(5)	(4)

	Asset	Description	s/n
(1)	LINE IMPEDANCE STABILIZATION NETWORK		
	i00010	HP 204D	1105A04683
x	i00017	HP 8903A	2216A01753
x	i00118	HP 33120A	US36002064
(2)	COAXIAL ATTENUATOR		
	i00122	NARDA 766-10	7802
	i00123	NARDA 766-10	7802A
x	i00113	SIERRA 661A-3D	1059
	i00069	BIRD 8329 (30 dB)	10066
(3)	MODULATION ANALYZER		
x	i00020	HP 8901A	2105A01087
(4)	AUDIO ANALYZER		
x	i00017	HP 8903A	2216A01753
(5)	SCOPE		
	i00058	HP 1741A	2215A09356
	i00071	Tektronix 935	1935-B011343

PAGE NO. 14 of 71.

NAME OF TEST: Audio Low Pass Filter (Voice Input)
g9930164: 1999-Mar-30 Tue 13:23:00
STATE: 0:General



SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 15 of 71.

NAME OF TEST: Modulation Limiting

SPECIFICATION: 47 CFR 2.1047(b)

GUIDE: TIA/EIA/IS-137-A-1996

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 (±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.

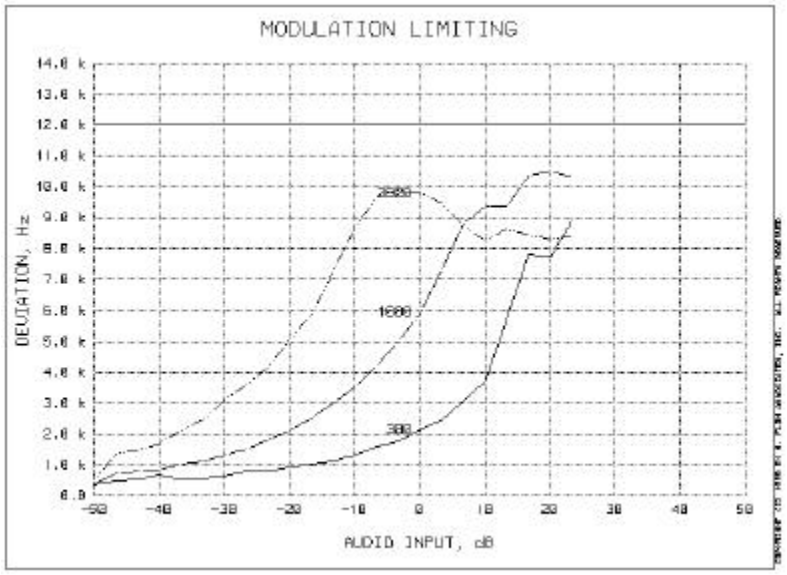
5. MEASUREMENT RESULTS ATTACHED FOR:

COMPANDER ON:
_x_ VOICE
_x_ VOICE + SAT

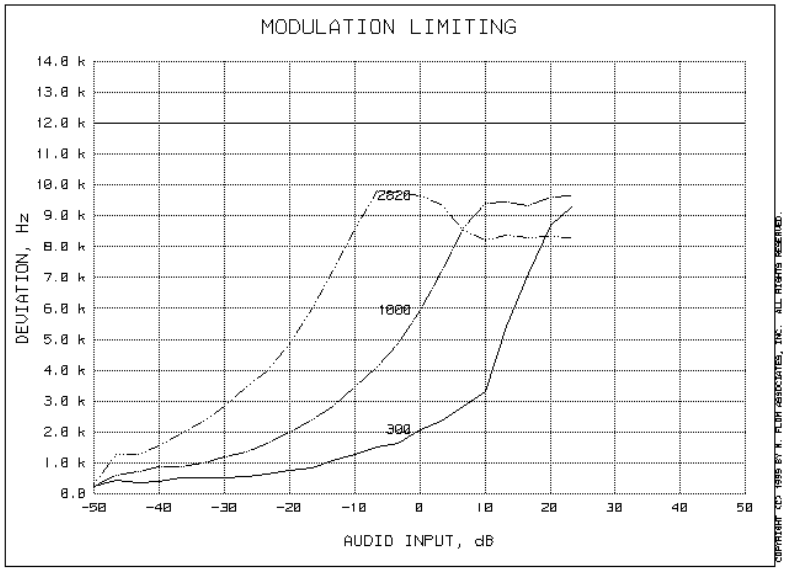
PAGE NO. 16 of 71.

NAME OF TEST: Modulation Limiting
g9930166: 1999-Mar-30 Tue 13:34:00
STATE: 0:General

Positive Peaks:



Negative Peaks:

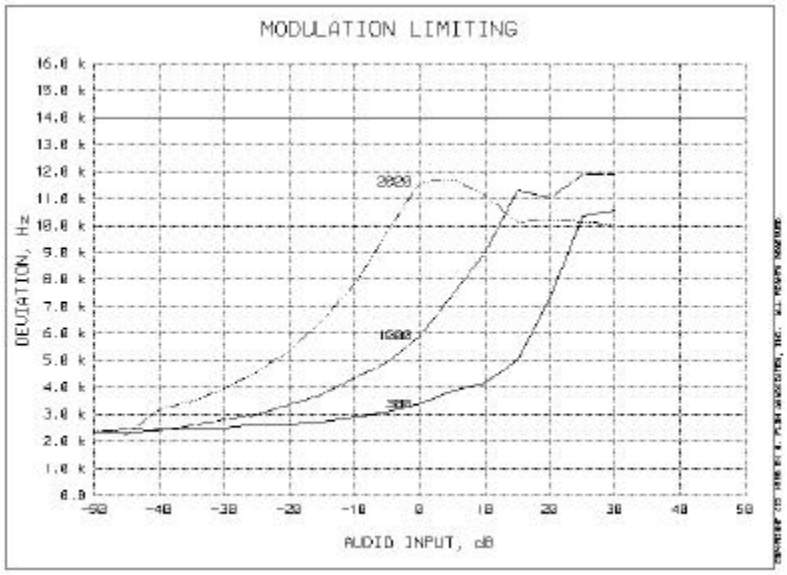


SUPERVISED BY: Morton Flom, P. Eng.

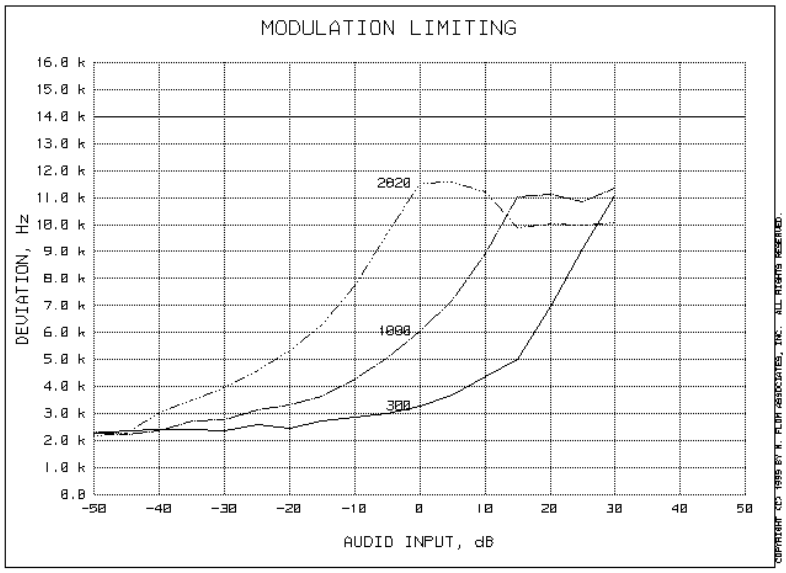
PAGE NO. 17 of 71.

NAME OF TEST: Modulation Limiting
g9930277: 1999-Mar-30 Tue 16:45:00
STATE: 0:General

Positive Peaks:



Negative Peaks:



SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 18 of 71.

NAME OF TEST: Measurement Of Maximum Deviation

GUIDE: TIA/EIA/IS-137-A-1996

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.

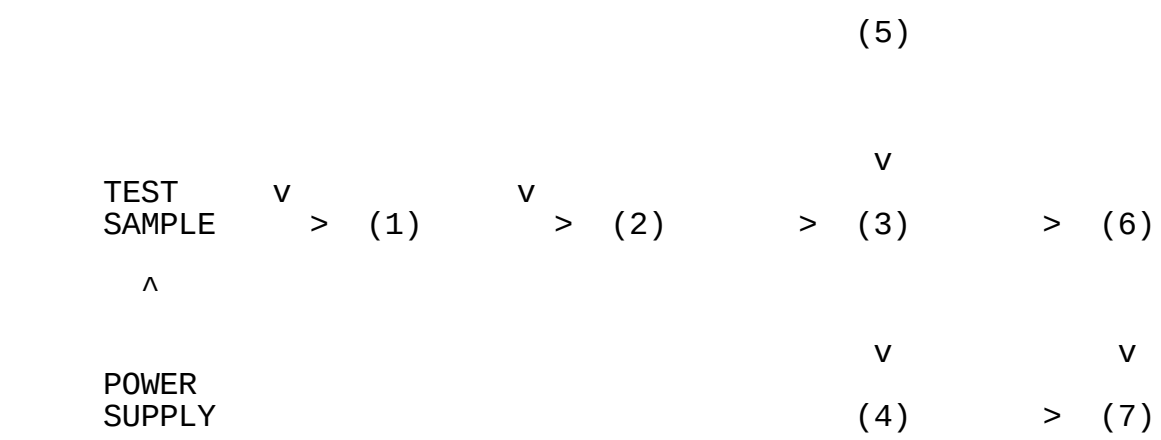
2. The EUT was modulated by an HP 8903 Audio Analyzer and/or internally generated signals.

3. Maximum deviation measurements were recorded for the various configurations.

4. MEASUREMENT RESULTS: ATTACHED SUMMARY FOR DEVIATION

PAGE NO. 19 of 71.

Measurement Of Maximum Deviation



	Asset	Description	s/n
(1)	AUDIO OSCILLATOR/GENERATOR		
___	i00010	HP 204D	1105A04683
_x_	i00017	HP 8903A	2216A01753
(2)	COAXIAL ATTENUATOR		
_x_	i00122	Narda 766-10	7802
_x_	i00123	Narda 766-10	7802A
___	i00113	Sierra 661A-3D	1059
(3)	FILTERS; NOTCH, HP, LP, BP		
___	i00126	Eagle TNF-1	100-250
___	i00125	Eagle TNF-1	50-60
_x_	i00124	Eagle TNF-1	250-850
(4)	SPECTRUM ANALYZER		
_x_	i00048	HP 8566B	2511A01467
___	i00029	HP 8563E	3213A00104
(5)	SCOPE		
_x_	i00030	HP 54502A	2927A00209

MEASUREMENT SUMMARY: Measurement Of Maximum Deviation

MODULATION	LIMIT, kHz	DEVIATION, MHz
(a) Voice	≥ 10.8 & ≤ 13.2	10.9
(b) Wideband Data	≥ 7.2 & ≤ 8.8	8.2
(c) SAT	≥ 1.8 & ≤ 2.2	2.0
(d) ST	≥ 7.2 & ≤ 8.8	8.0
(e) SAT + VOICE	N/A	11.6
(f) SAT + DTMF	N/A	11.1
(g) CDMA	N/A	N/A
(h) TDMA	N/A	N/A
(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

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 21 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)

SPECIFICATION: 47 CFR 2.1049(c)(1)

GUIDE: TIA/EIA/IS-137-A-1996

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

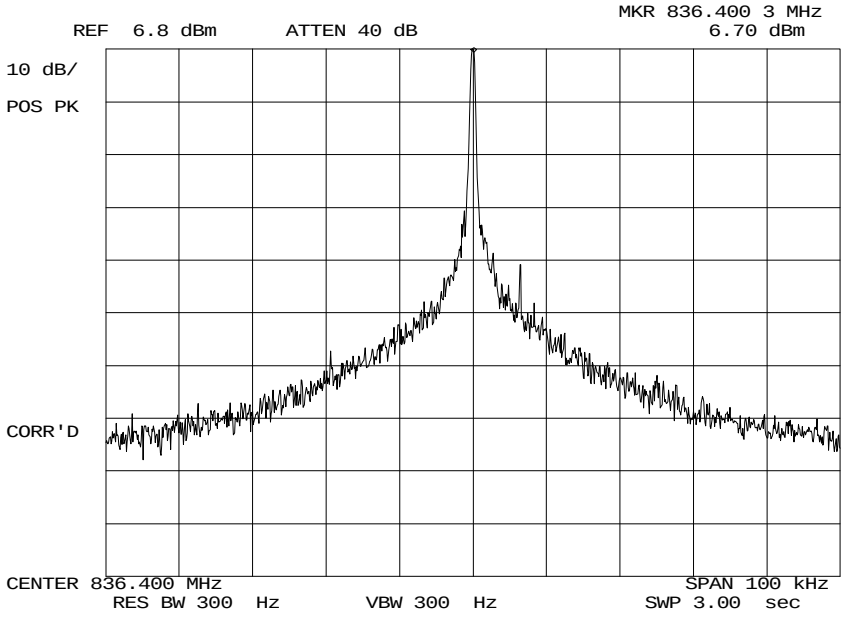
MEASUREMENT SUMMARY: Emission Masks (Occupied Bandwidth)

MODULATION	MEASURED DEVIATION ±kHz (HP 8901A)	LIMIT ±kHz	B/W @-26 dB PLOTS, kHz
NONE	0.0	0.0	0.0
VOICE	10.9	≥ 10.8 & ≤ 13.2	24.0
WIDEBAND DATA	8.2	≥ 7.2 & ≤ 8.8	22.0
SAT + VOICE	11.6	N/A	28.0
SAT + DTMF	11.1	N/A	25.0
CDMA	N/A	N/A	N/A
TDMA	N/A	N/A	28.0
NAMPS	N/A	N/A	N/A

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 23 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930301: 1999-Mar-29 Mon 13:50:00
STATE: 1:Low Power

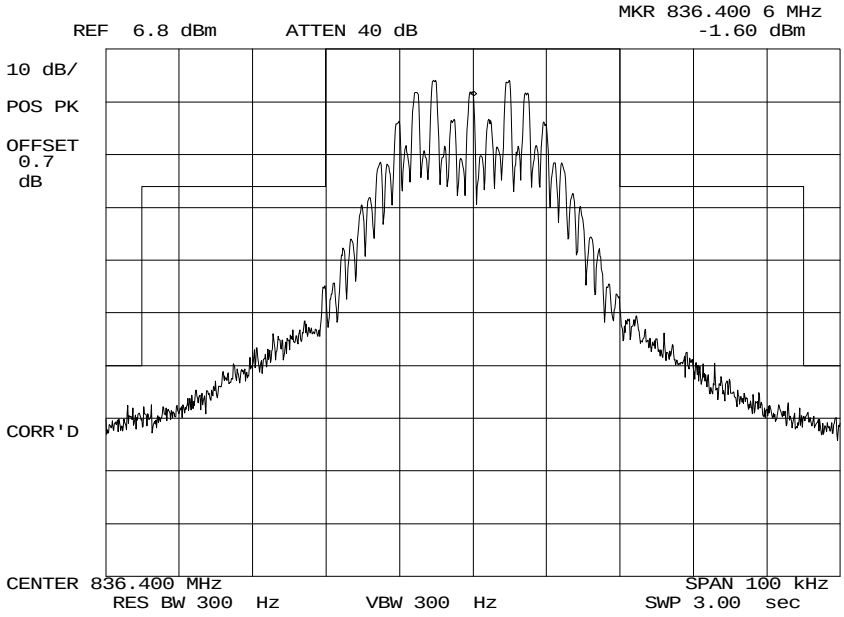


POWER: LOW
MODULATION: NONE

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 24 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930300: 1999-Mar-29 Mon 13:49:00
STATE: 1:Low Power

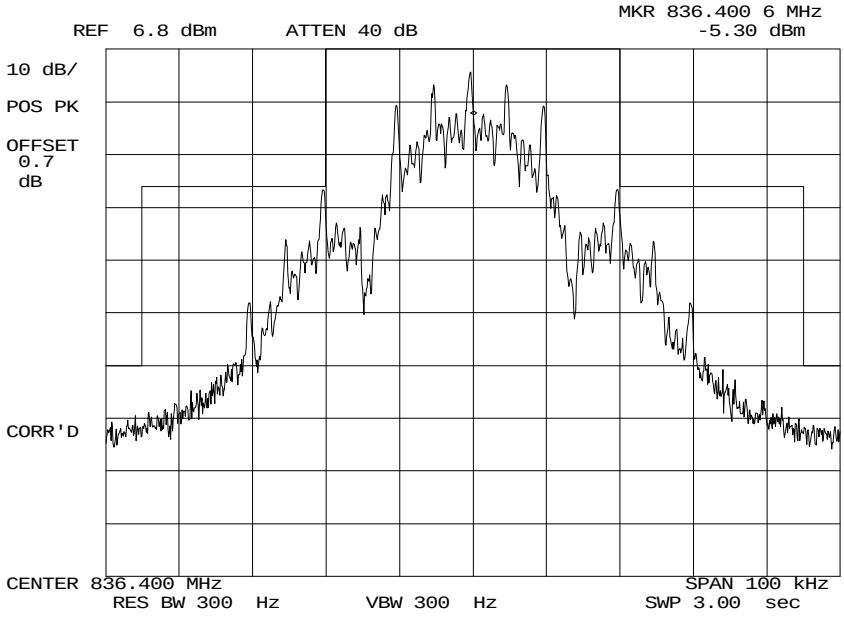


POWER: LOW
MODULATION: VOICE: 2500 Hz SINE WAVE
MASK: AMPS CELLULAR,
F3E/F3D W/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 25 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930313: 1999-Mar-29 Mon 14:52:00
STATE: 1:Low Power

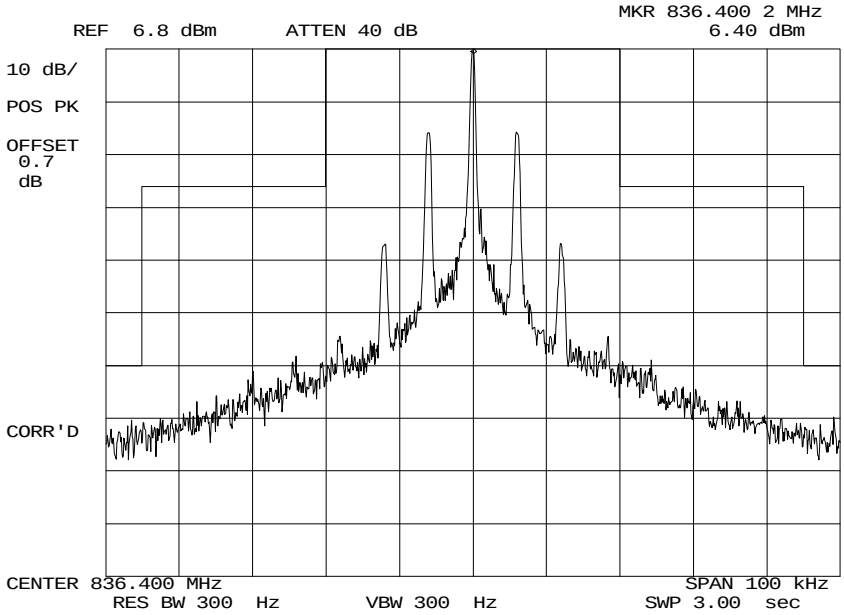


POWER: LOW
MODULATION: WBD
MASK: AMPS CELLULAR, F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 26 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930312: 1999-Mar-29 Mon 14:50:00
STATE: 1:Low Power

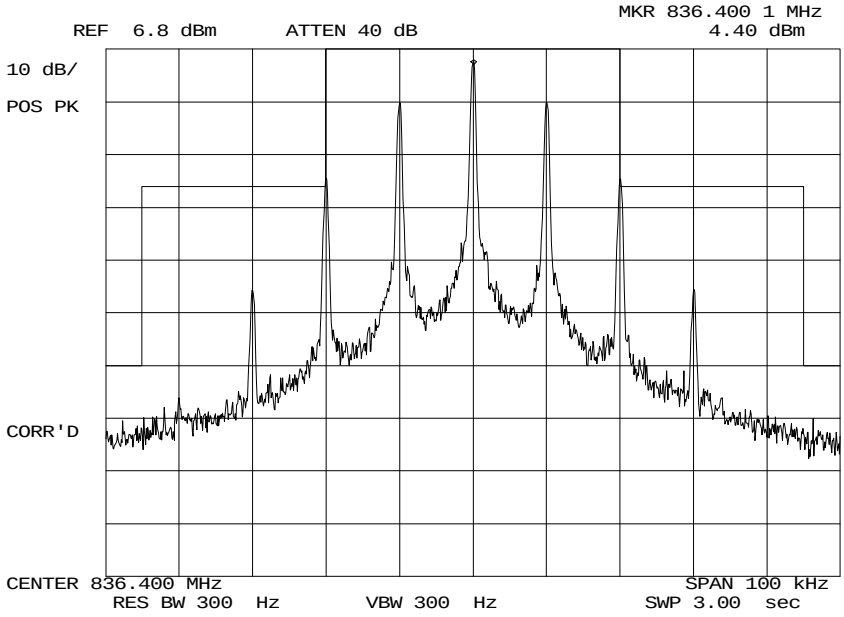


POWER: LOW
MODULATION: SAT
MASK: AMPS CELLULAR,
F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 27 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930305: 1999-Mar-29 Mon 14:19:00
STATE: 1:Low Power

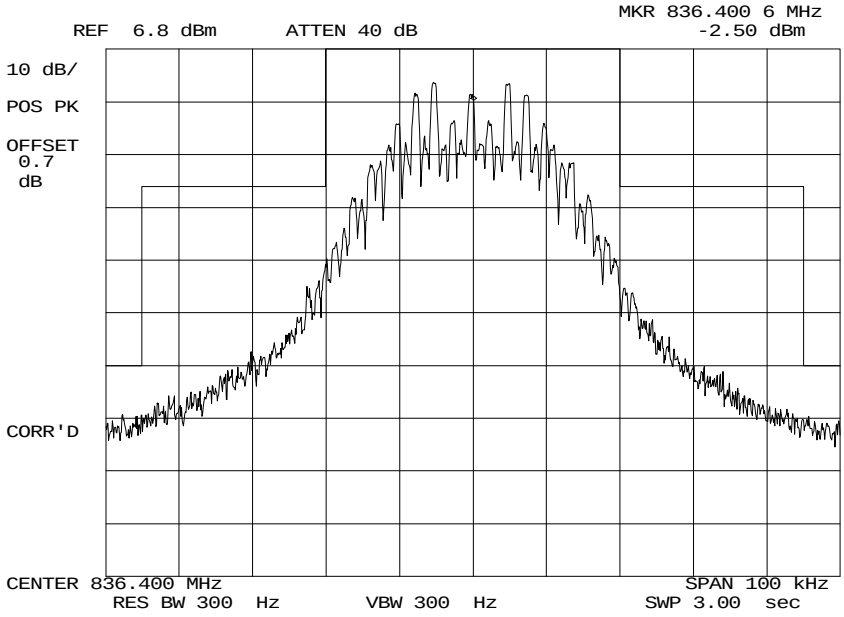


POWER: LOW
MODULATION: ST
MASK: AMPS CELLULAR, F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 28 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930304: 1999-Mar-29 Mon 14:02:00
STATE: 1:Low Power

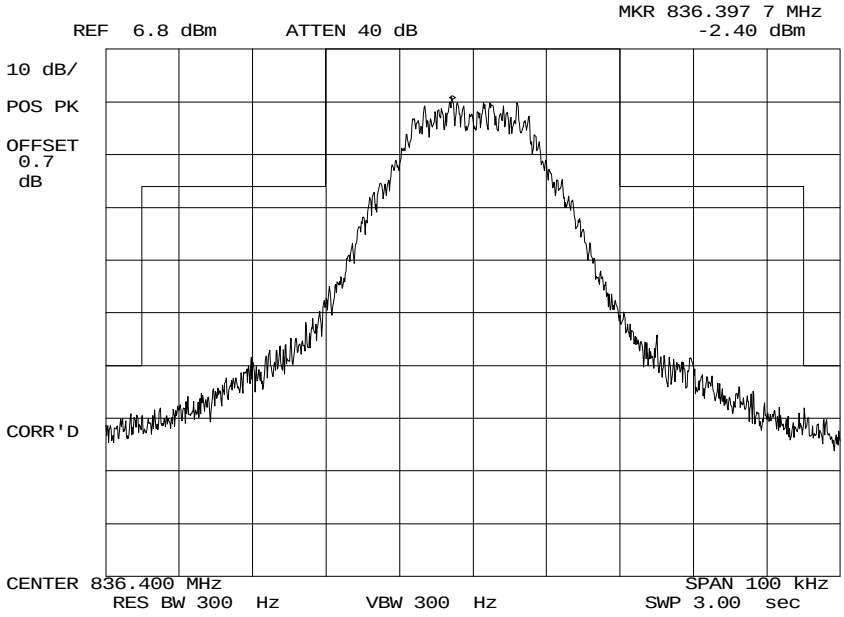


POWER: LOW
MODULATION: SAT+VOICE
MASK: AMPS CELLULAR,
F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 29 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930309: 1999-Mar-29 Mon 14:32:00
STATE: 1:Low Power

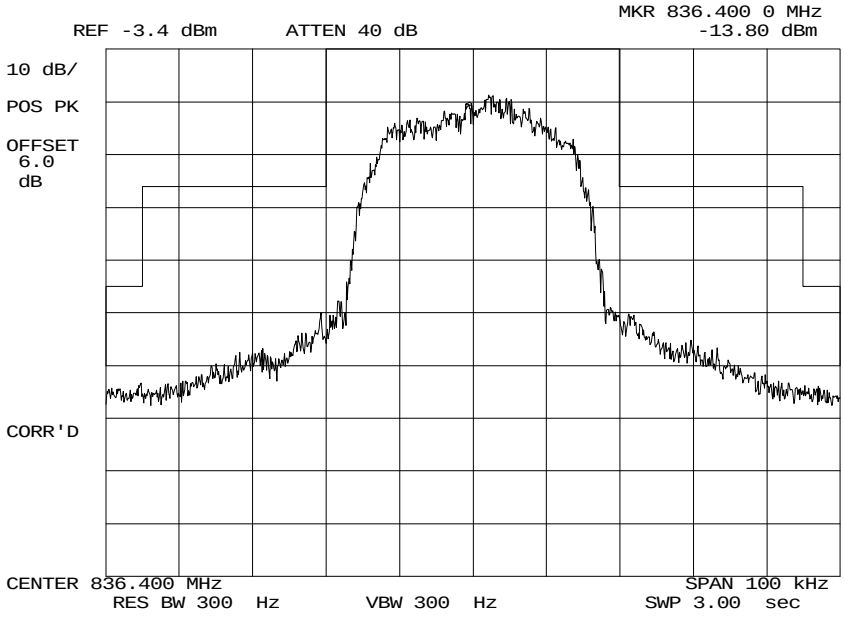


POWER: LOW
MODULATION: SAT+DTMF
MASK: AMPS CELLULAR,
F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 30 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930332: 1999-Mar-30 Tue 12:37:00
STATE: 1:Low Power

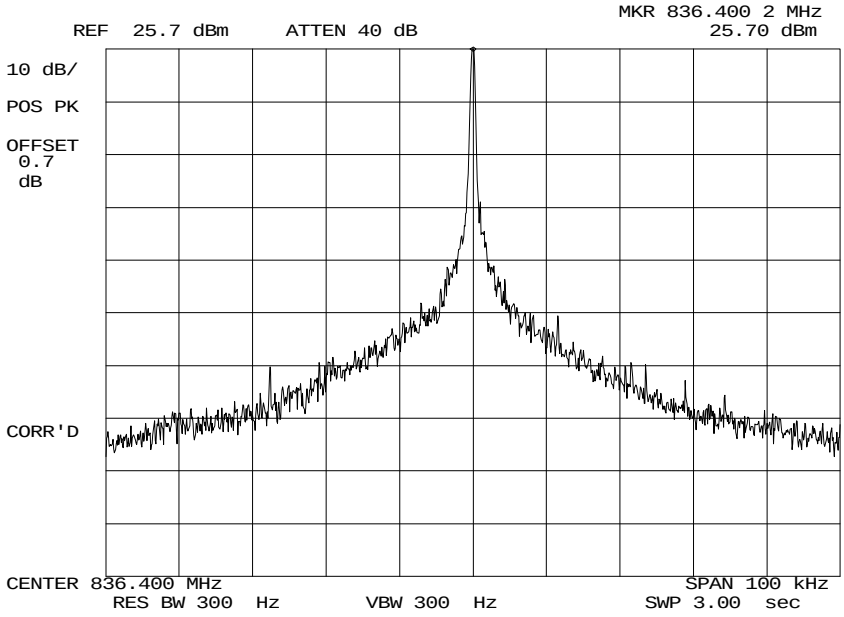


POWER: LOW
MODULATION: TDMA
MASK: AMPS CELLULAR, F1D, DATA

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 31 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930302: 1999-Mar-29 Mon 13:51:00
STATE: 2:High Power

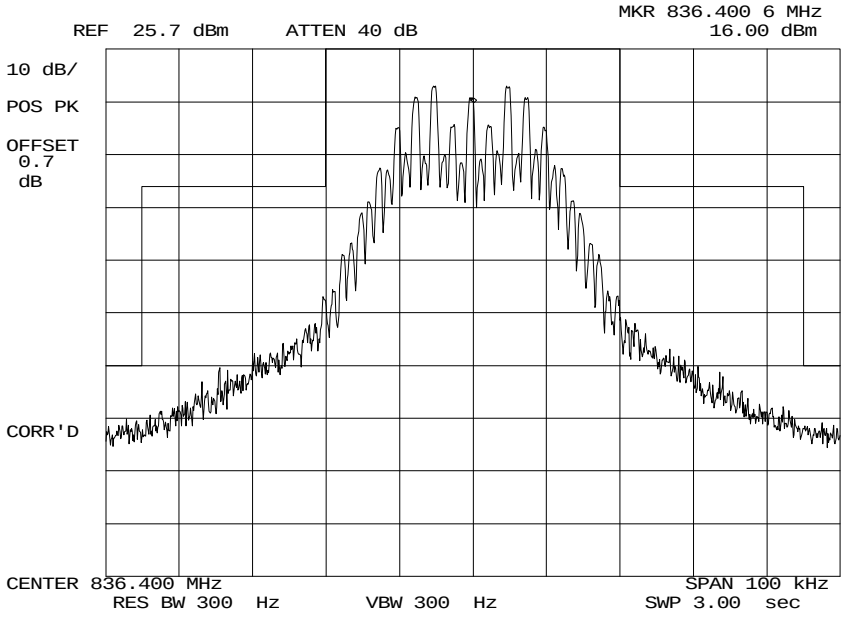


POWER: HIGH
MODULATION: NONE

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 32 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930299: 1999-Mar-29 Mon 13:47:00
STATE: 2:High Power

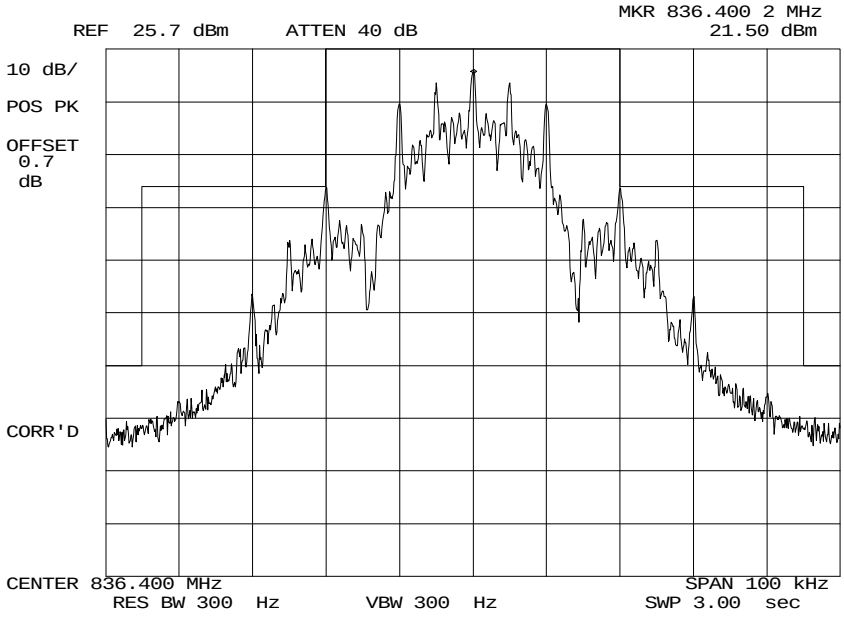


POWER: HIGH
MODULATION: VOICE: 2500 Hz SINE WAVE
MASK: AMPS CELLULAR,
F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 33 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930314: 1999-Mar-29 Mon 14:55:00
STATE: 2:High Power

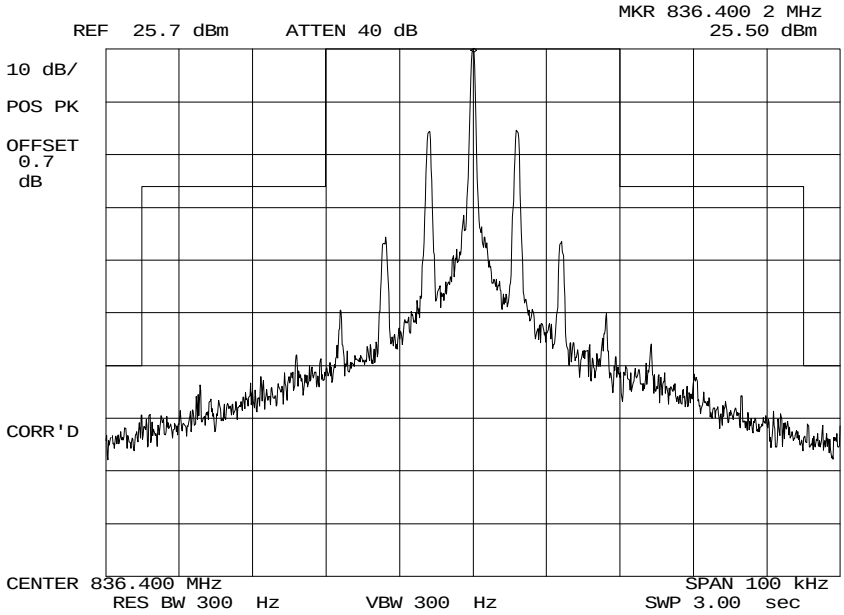


POWER: HIGH
MODULATION: WBD
MASK: AMPS CELLULAR, F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 34 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930311: 1999-Mar-29 Mon 14:47:00
STATE: 2:High Power

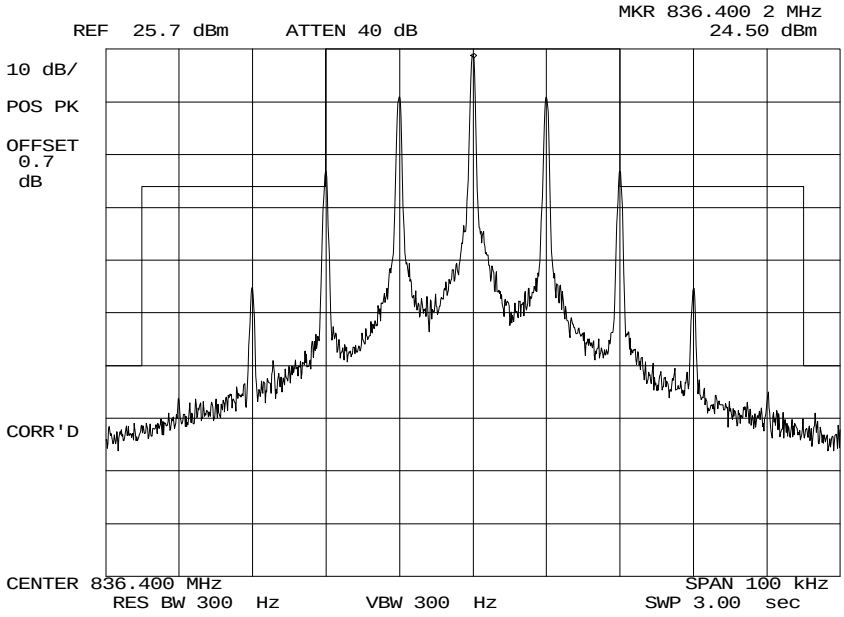


POWER: HIGH
MODULATION: SAT
MASK: AMPS CELLULAR,
F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 35 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930307: 1999-Mar-29 Mon 14:24:00
STATE: 2:High Power

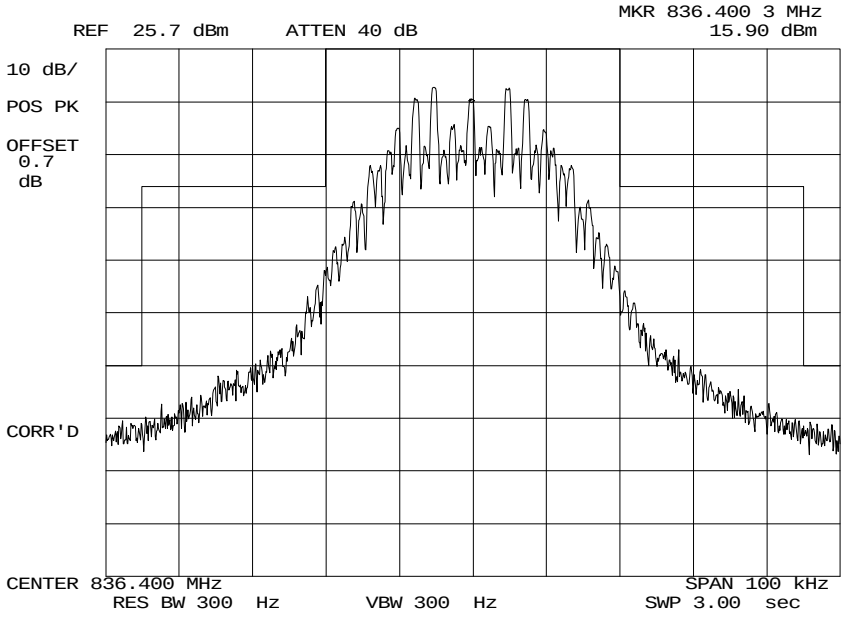


POWER: HIGH
MODULATION: ST
MASK: AMPS CELLULAR, F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 36 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930303: 1999-Mar-29 Mon 13:59:00
STATE: 2:High Power

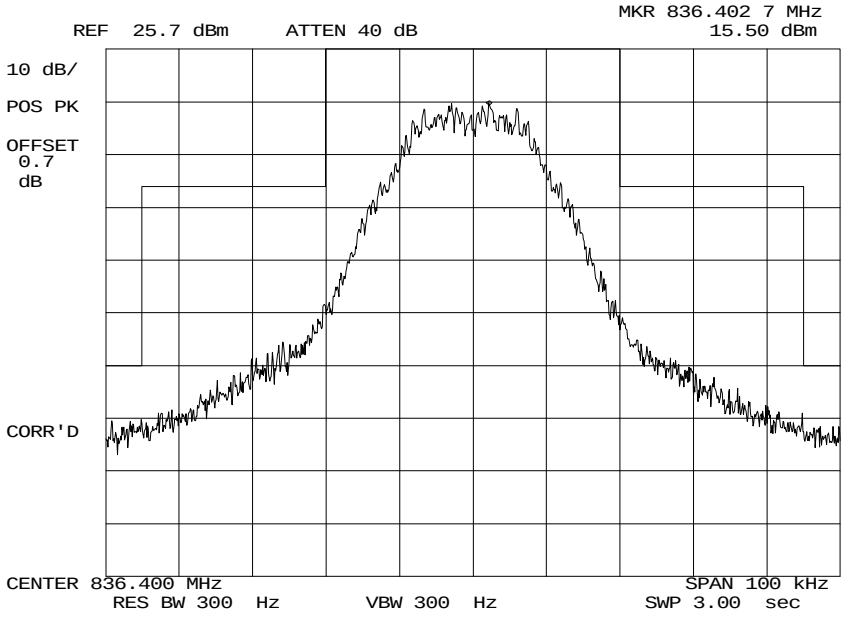


POWER: HIGH
MODULATION: SAT+VOICE
MASK: AMPS CELLULAR,
F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 37 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930308: 1999-Mar-29 Mon 14:30:00
STATE: 2:High Power

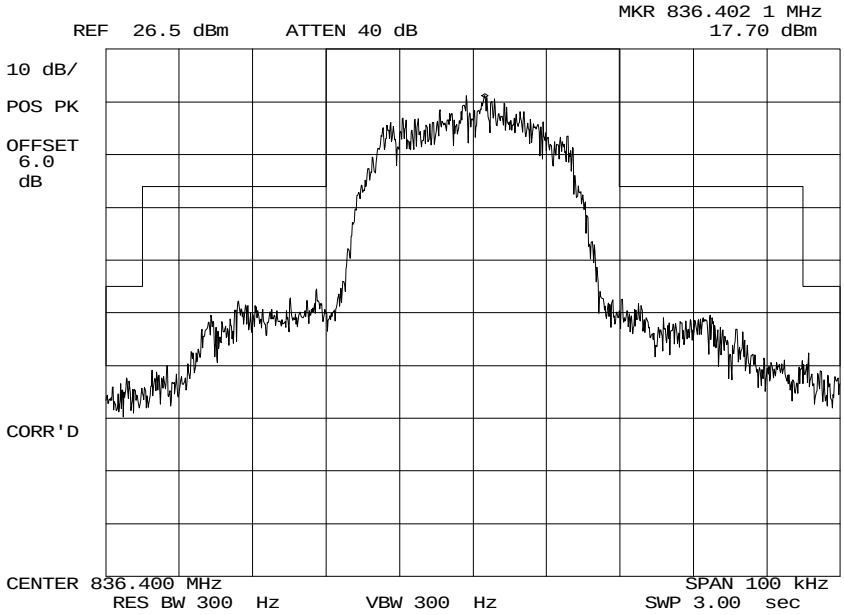


POWER: HIGH
MODULATION: SAT+DTMF
MASK: AMPS CELLULAR,
F3E/F3D w/LPF

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 38 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930331: 1999-Mar-30 Tue 12:32:00
STATE: 2:High Power



POWER: HIGH
MODULATION: TDMA
MASK: AMPS CELLULAR, F1D, DATA

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 39 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth

SPECIFICATION: 2.1049(c), 24.238(b): Occupied Bandwidth
24: Emissions at Band Edges

GUIDE: TIA/EIA/IS-137-A-1996

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page with the Spectrum Analyzer connected.

2. The low and high channels for all RF powers within the designated frequency block(s) were measured.

3. MEASUREMENT RESULTS: ATTACHED

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 40 of 71.

TRANSMITTER SPURIOUS EMISSION

TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)
TEST B. OUT-OF-BAND SPURIOUS

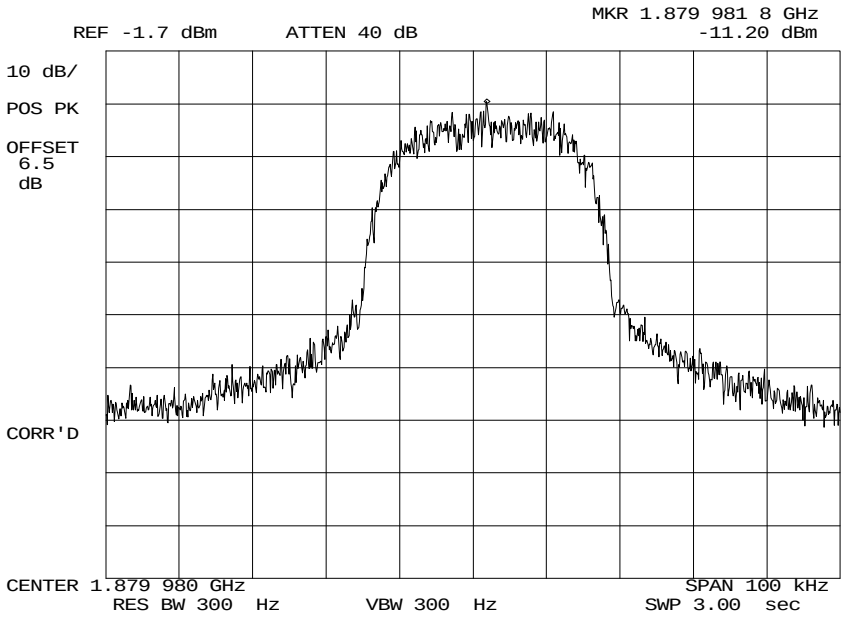
---

(1)	TEST SAMPLE	(2)	(3)
POWER SUPPLY		(5)	(4)

	Asset	Description	s/n
(1)		AUDIO OSCILLATOR/GENERATOR	
___	i00010	HP 204D	1105A04683
x	i00017	HP 8903A	2216A01753
___	i00012	HP 3312A	1432A11250
(2)		COAXIAL ATTENUATOR	
x	i00122	Narda 766-10	7802
___	i00123	Narda 766-10	7802A
___	i00069	Bird 8329 (30 dB)	1006
___	i00113	Sierra 661A-3D	1059
(3)		FILTERS; NOTCH, HP, LP, BP	
___	i00126	Eagle TNF-1	100-250
___	i00125	Eagle TNF-1	50-60
x	i00124	Eagle TNF-1	250-850
(4)		SPECTRUM ANALYZER	
x	i00048	HP 8566B	2511A01467
___	i00029	HP 8563E	3213A00104
(5)		SCOPE	
___	i00058	HP 1741A	2251A09356
___	i00030	HP 54502A	2927A00209
___	i00071	Tektronix 935	1935-B011343

PAGE NO. 41 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930351: 1999-Mar-30 Tue 16:16:00
STATE: 1:Low Power

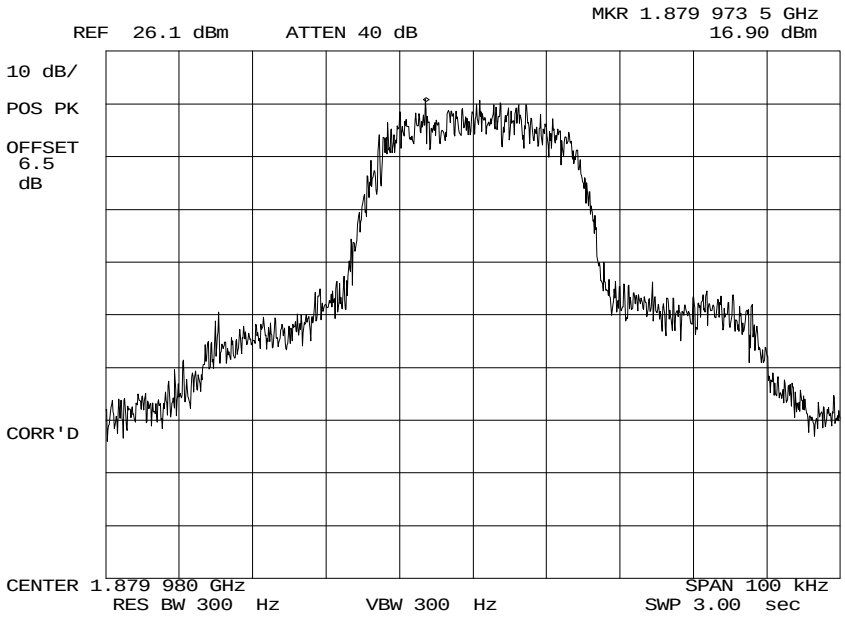


POWER: LOW
MODULATION: TDMA PCS

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 42 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930350: 1999-Mar-30 Tue 16:10:00
STATE: 2:High Power

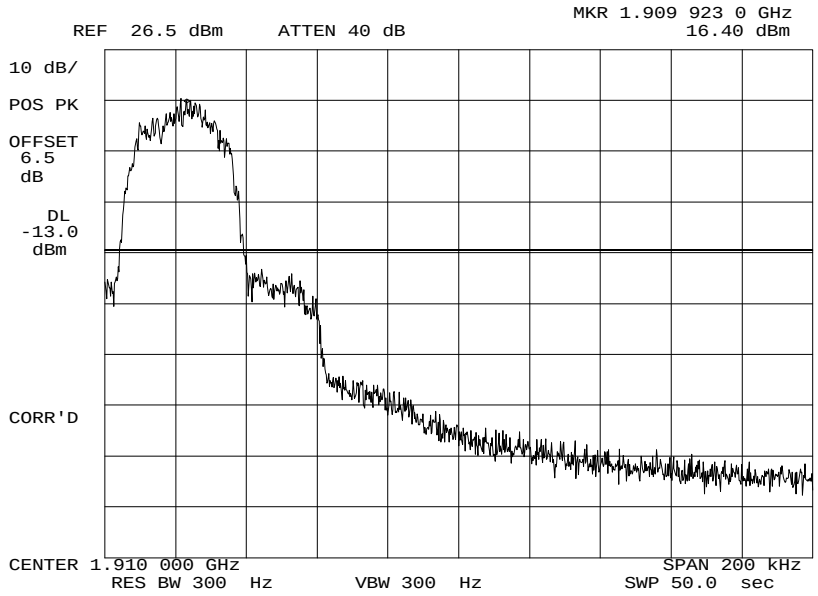


POWER: HIGH
MODULATION: TDMA PCS

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 43 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930327: 1999-Mar-30 Tue 12:04:00
STATE: 2:High Power

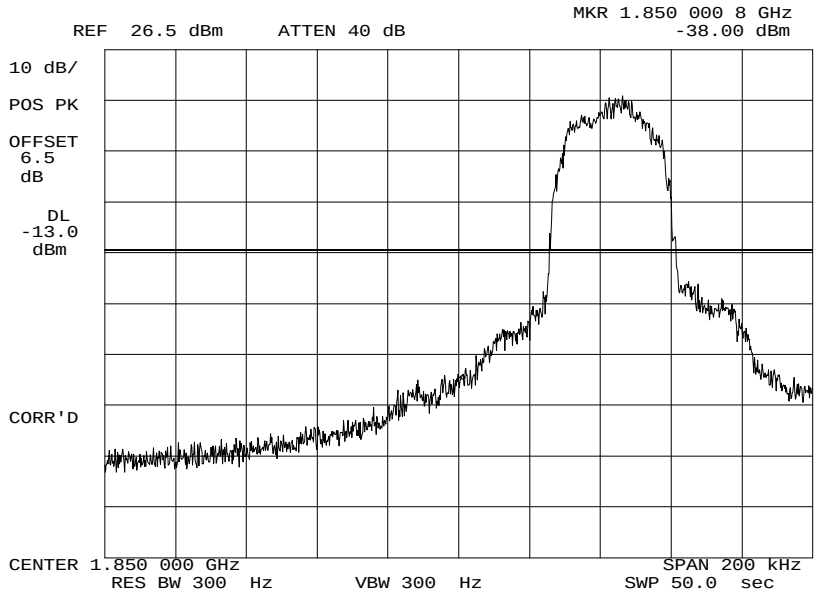


POWER: HIGH
MODULATION: TDMA PCS
UPPER BANDEDGE

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 44 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930328: 1999-Mar-30 Tue 12:08:00
STATE: 2:High Power

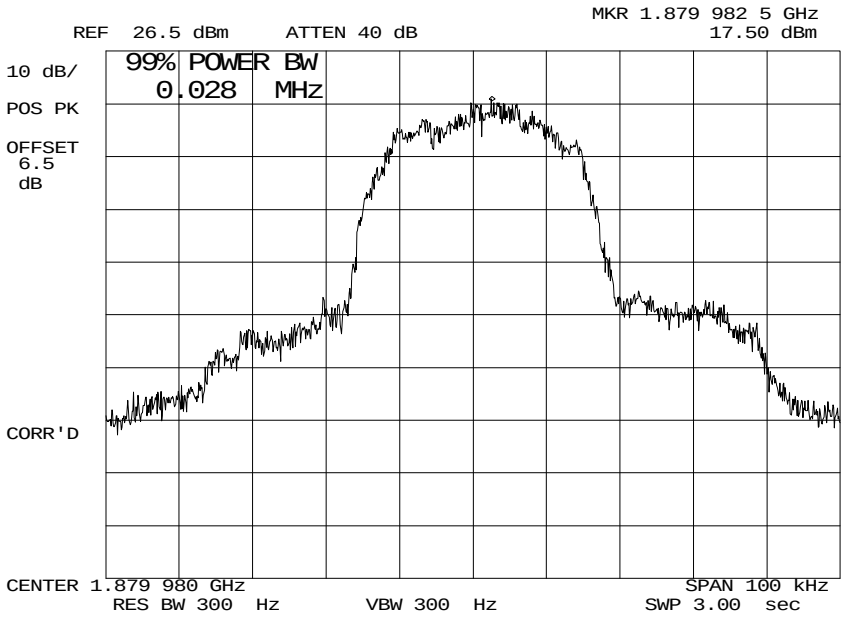


POWER: HIGH
MODULATION: TDMA PCS
LOWER BANDEDGE

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 45 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930329: 1999-Mar-30 Tue 12:15:00
STATE: 2:High Power



POWER: HIGH
MODULATION: TDMA PCS
99 % POWER BANDWIDTH

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 46 of 71.

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

SPECIFICATION: 47 CFR 22.917

GUIDE: TIA/EIA/IS-137-A-1996

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^{th} 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

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	≤-26	≤-44.0	≤-54.0
F0 + 45 kHz to 2nd Harmonic	≤-60 or 43 + 10 log P	≤-70.0	≤-64.0
2nd to 10th	(≤-13 dBm)	≤-27.8	≤-55.8

MEASUREMENT RESULTS = ATTACHED OFFSET PLOTS

EMISSION IN THE RECEIVER CRITICAL BAND

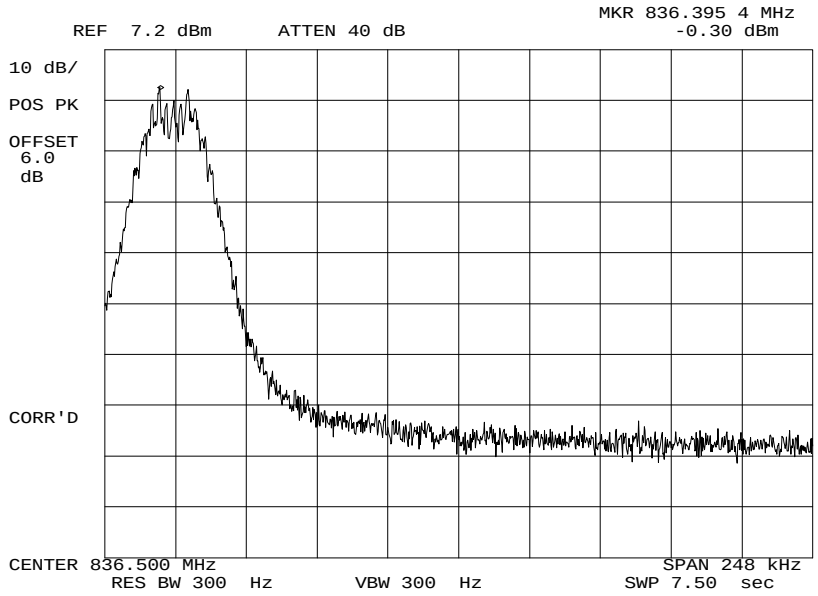
EMISSION, MHz/HARM.	LIMIT, dBm	SPURIOUS EMISSIONS, dBm Lo	Hi
869 to 894	≤-80	≤-85.8	≤-86.2

MEASUREMENT RESULTS = ATTACHED PLOTS

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 48 of 71.

NAME OF TEST: Out-Of-Band Emissions (Occupied Bandwidth)
g9930342: 1999-Mar-30 Tue 15:50:00
STATE: 1:Low Power

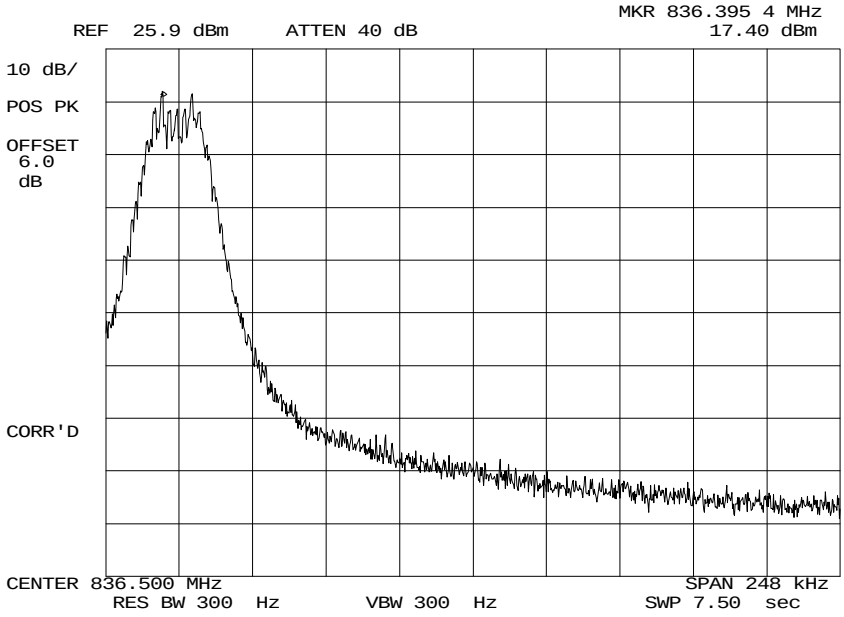


POWER: LOW
MODULATION: SAT+VOICE
OFFSET OCCUPIED BANDWIDTH

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 49 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930341: 1999-Mar-30 Tue 15:48:00
STATE: 2:High Power

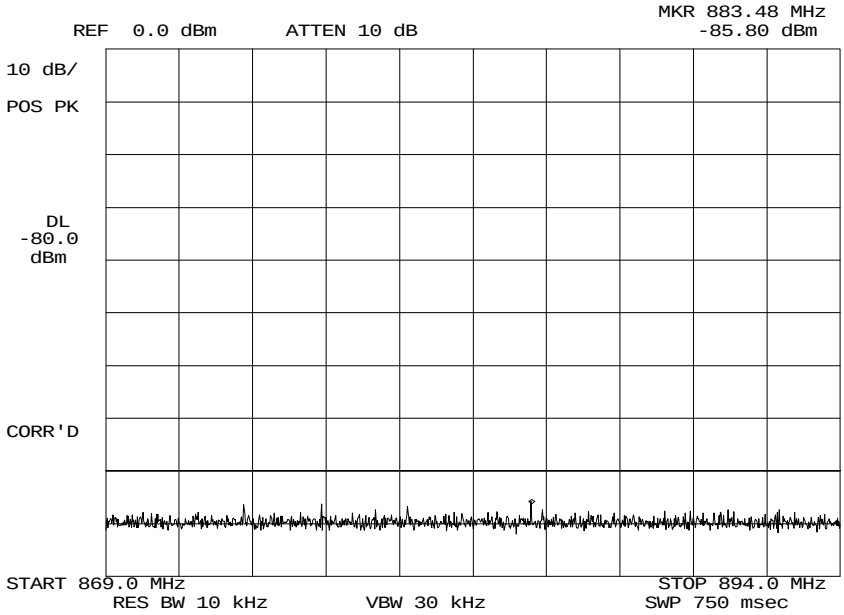


POWER: HIGH
MODULATION: SAT+VOICE
OFFSET OCCUPIED BANDWIDTH

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 50 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930343: 1999-Mar-30 Tue 15:56:00
STATE: 1:Low Power

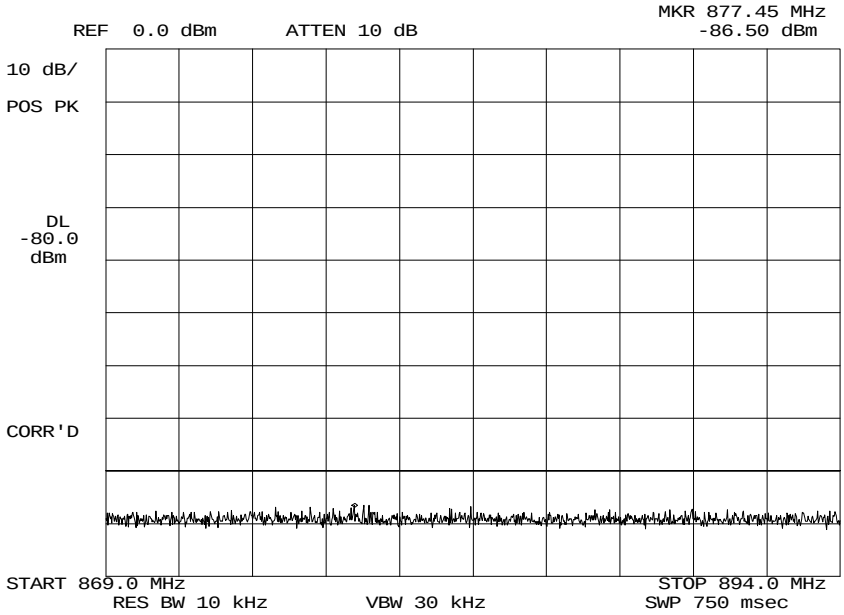


POWER: LOW
MODULATION: SAT+VOICE
TX SPURS IN RX CRITICAL BAND

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 51 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930344: 1999-Mar-30 Tue 15:58:00
STATE: 2:High Power



POWER: HIGH
MODULATION: SAT+VOICE
TX SPURS IN RX CRITICAL BAND

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 52 of 71.

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	≤-37.0
F0 + 45 kHz to F0 + 90 kHz	≤-45	≤-70.0	≤-73.0
F0 + 90 kHz to 2nd Harmonic	≤-60 (≤-13 dBm)	≤-62.0	≤-64.7
2nd to 10th	(≤-13 dBm)	≤-27.8	≤-55.8

MEASUREMENT RESULTS = ATTACHED OFFSET PLOTS

EMISSION IN THE RECEIVER CRITICAL BAND

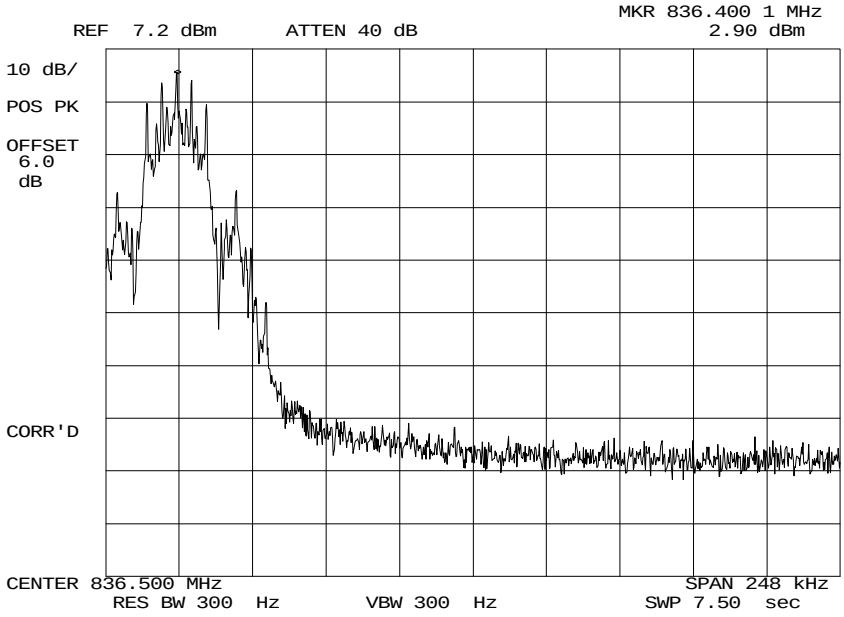
EMISSION, MHz/HARM.	LIMIT, dBm	SPURIOUS EMISSIONS, dBm Lo	Hi
869 to 894	≤-80	≤-85.8	≤-86.2

MEASUREMENT RESULTS = ATTACHED PLOTS

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 53 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930346: 1999-Mar-30 Tue 16:03:00
STATE: 1:Low Power

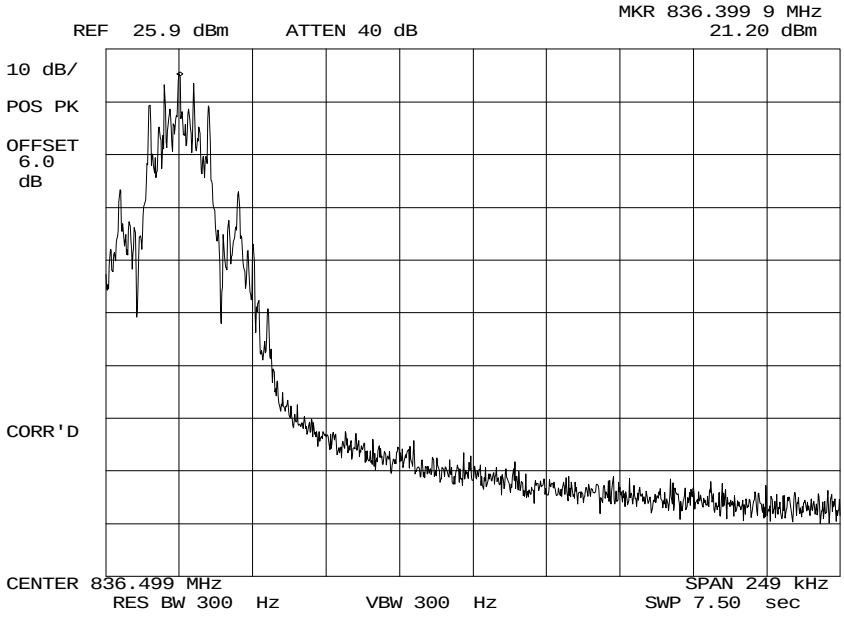


POWER: LOW
MODULATION: WBD
OFFSET OCCUPIED BANDWIDTH

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 54 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930345: 1999-Mar-30 Tue 16:01:00
STATE: 2:High Power

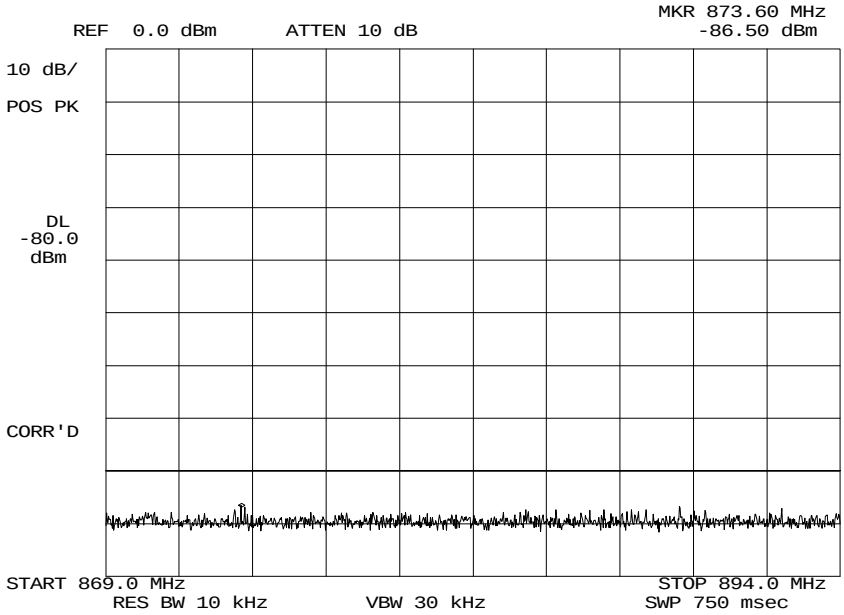


POWER: HIGH
MODULATION: WBD
OFFSET OCCUPIED BANDWIDTH

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 55 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930347: 1999-Mar-30 Tue 16:04:00
STATE: 1:Low Power

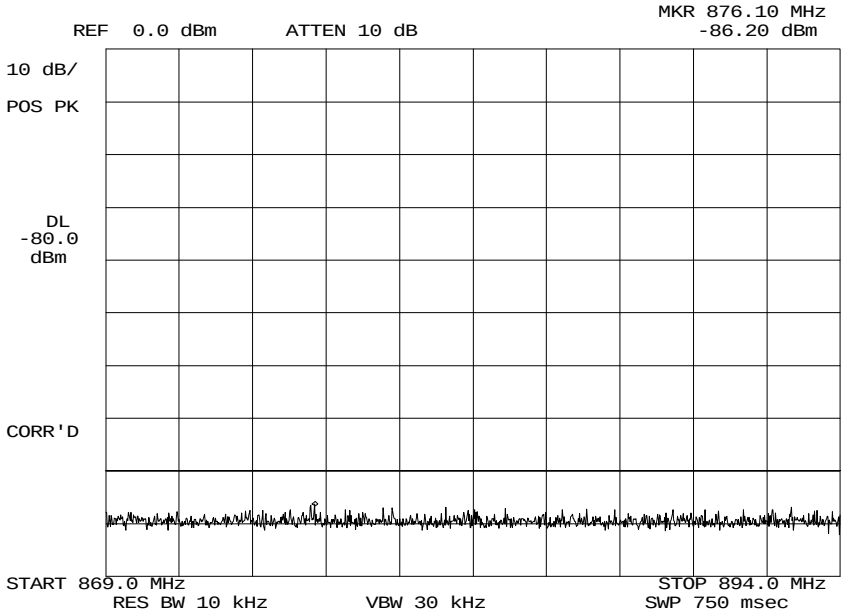


POWER: LOW
MODULATION: WBD
TX SPURS IN RX CRITICAL BAND

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 56 of 71.

NAME OF TEST: Emission Masks (Occupied Bandwidth)
g9930348: 1999-Mar-30 Tue 16:05:00
STATE: 2:High Power



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

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 57 of 71.

NAME OF TEST: Spurious Emissions at Antenna Terminals

SPECIFICATION: 47 CFR 2.1051, 22.917

GUIDE: TIA/EIA/IS-137-A-1996

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT was connected to a coaxial attenuator and then to a Spectrum Analyzer.

2. A notch filter was introduced to reduce or eliminate spurious emission which could be generated internally in the spectrum analyzer.

3. Measurements were made over the range from 45 kHz to 10 GHz for the worst case modulation so both the highest and lowest R.F. power settings.

4. All other emissions were 20 dB or more below the limit.

5. Spectrum analyzer bandwidth was set to section 22.917(h) as applicable.

6. MEASUREMENT RESULTS: ATTACHED

PAGE NO. 58 of 71.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
g9930322: 1999-Mar-30 Tue 11:20:00
STATE: 1:Low Power AMPS-FM

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
836.400000	1672.546000	-47.8	-55	-34.8
836.400000	2508.776000	-48.9	-56.1	-35.9
836.400000	3345.962000	-50	-57.2	-37
836.400000	4181.674000	-50.2	-57.4	-37.2
836.400000	5017.934000	-49.3	-56.5	-36.3
836.400000	5854.965000	-41.4	-48.6	-28.4
836.400000	6691.635000	-43	-50.2	-30
836.400000	7527.760000	-43	-50.2	-30
836.400000	8364.355000	-43.5	-50.7	-30.5
836.400000	9200.647000	-44.3	-51.5	-31.3
836.400000	10036.308000	-44	-51.2	-31
836.400000	10873.118000	-42.9	-50.1	-29.9
836.400000	11709.657000	-42.5	-49.7	-29.5
836.400000	12546.274000	-38.5	-45.7	-25.5

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
g9930319: 1999-Mar-30 Tue 10:29:00
STATE: 2:High Power AMPS-FM

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
836.400000	1672.813000	-39	-64.7	-26
836.400000	2509.198000	-47.6	-73.3	-34.6
836.400000	3345.249000	-50	-75.7	-37
836.400000	4181.816000	-50.2	-75.9	-37.2
836.400000	5018.553000	-49.2	-74.9	-36.2
836.400000	5854.399000	-43.5	-69.2	-30.5
836.400000	6691.501000	-43.4	-69.1	-30.4
836.400000	7527.543000	-43.9	-69.6	-30.9
836.400000	8363.552000	-43.1	-68.8	-30.1
836.400000	9200.293000	-43.6	-69.3	-30.6
836.400000	10036.352000	-43.7	-69.4	-30.7
836.400000	10873.253000	-43	-68.7	-30
836.400000	11709.846000	-42.9	-68.6	-29.9
836.400000	12546.309000	-38.3	-64	-25.3

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
g9930356: 1999-Mar-31 Wed 10:08:00
STATE: 1:Low Power AMPS-TDMA

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
836.400000	1673.269000	-52.5	-49	-39.5
836.400000	2509.032000	-54.4	-50.9	-41.4
836.400000	3345.683000	-54.8	-51.3	-41.8
836.400000	4181.938000	-54.9	-51.4	-41.9
836.400000	5017.968000	-53.7	-50.2	-40.7
836.400000	5855.231000	-49.2	-45.7	-36.2
836.400000	6691.413000	-48.5	-45	-35.5
836.400000	7527.228000	-49	-45.5	-36
836.400000	8363.597000	-48.9	-45.4	-35.9
836.400000	9200.272000	-50	-46.5	-37
836.400000	10036.848000	-48	-44.5	-35
836.400000	10873.501000	-49.4	-45.9	-36.4
836.400000	11709.996000	-49.2	-45.7	-36.2
836.400000	12545.661000	-44.5	-41	-31.5

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
g9930354: 1999-Mar-31 Wed 10:03:00
STATE: 2:High Power AMPS-TDMA

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
836.400000	1672.849000	-53.8	-80.3	-40.8
836.400000	2509.311000	-53.8	-80.3	-40.8
836.400000	3345.429000	-55.6	-82.1	-42.6
836.400000	4182.031000	-54.1	-80.6	-41.1
836.400000	5018.115000	-54.1	-80.6	-41.1
836.400000	5854.424000	-48.8	-75.3	-35.8
836.400000	6691.229000	-48.5	-75	-35.5
836.400000	7527.308000	-48.6	-75.1	-35.6
836.400000	8363.689000	-49.5	-76	-36.5
836.400000	9200.417000	-49.6	-76.1	-36.6
836.400000	10036.551000	-49.3	-75.8	-36.3
836.400000	10873.605000	-48.5	-75	-35.5
836.400000	11709.359000	-48.8	-75.3	-35.8
836.400000	12545.522000	-44.3	-70.8	-31.3

PAGE NO. 60 of 71.

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
g9930325: 1999-Mar-30 Tue 11:49:00
STATE: 1:Low Power TDMA-PCS

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
1879.980000	3759.488000	-48.4	-47	-35.4
1879.980000	5639.868000	-48.2	-46.8	-35.2
1879.980000	7519.919000	-43.1	-41.7	-30.1
1879.980000	9399.807000	-43	-41.6	-30
1879.980000	11279.798000	-41.4	-40	-28.4
1879.980000	13159.629000	-37.1	-35.7	-24.1
1879.980000	15039.605000	-36.5	-35.1	-23.5
1879.980000	16919.653000	-35.6	-34.2	-22.6
1879.980000	18799.390000	-31.3	-29.9	-18.3
1879.980000	20679.368000	-29.2	-27.8	-16.2

NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
g9930323: 1999-Mar-30 Tue 11:40:00
STATE: 2:High Power TDMA-PCS

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
1879.980000	3760.229000	-49.6	-76.1	-36.6
1879.980000	5639.948000	-39.9	-66.4	-26.9
1879.980000	7519.843000	-42.2	-68.7	-29.2
1879.980000	9399.979000	-43.4	-69.9	-30.4
1879.980000	11280.300000	-43.1	-69.6	-30.1
1879.980000	13160.080000	-38.5	-65	-25.5
1879.980000	15039.649000	-37.2	-63.7	-24.2
1879.980000	16920.000000	-35.3	-61.8	-22.3
1879.980000	18799.781000	-30.4	-56.9	-17.4
1879.980000	20679.552000	-29.3	-55.8	-16.3

PAGE NO. 61 of 71.

NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

GUIDE: TIA/EIA/IS-137-A-1996

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.

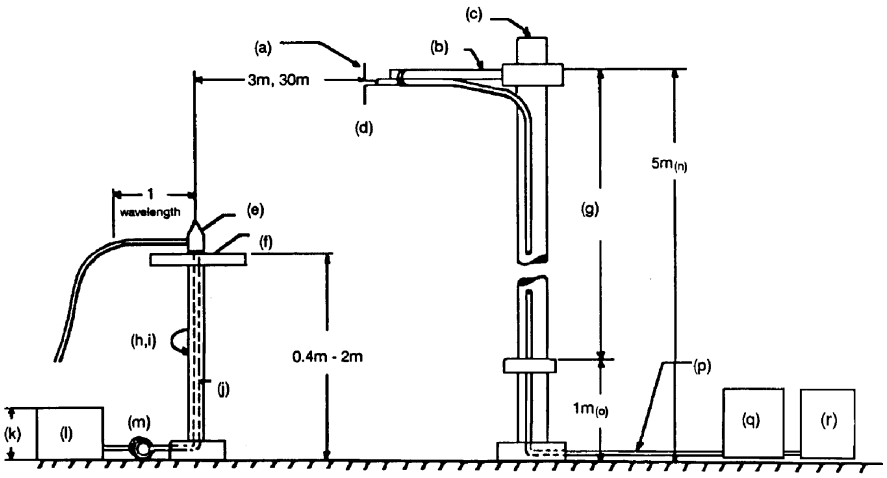
6. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.

7. The worst case for all channels is shown.

8. Measurement results: ATTACHED FOR WORST CASE

PAGE NO. 62 of 71.

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 (Per ANSI C63.4-1992, 10.1.4)	Last Cal
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	Aprel 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-98
SPECTRUM ANALYZER					
	i00029	HP 8563E	3213A00104	12 mo.	Aug-98
x	i00033	HP 85462A	3625A00357	12 mo.	Dec-98
	i00048	HP 8566B	2511AD1467	6 mo.	Dec-98

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
AMPS-FM:			
824.040	991	2^{nd} – 10^{th}	<-44
836.400	380	2^{nd} – 10^{th}	<-44
848.970	799	2^{nd} – 10^{th}	<-44
AMPS-TDMA:			
824.040	991	2^{nd} – 10^{th}	<-44
836.400	380	2^{nd} – 10^{th}	<-44
848.970	799	2^{nd} – 10^{th}	<-44
PCS-TDMA:			
1850.04	2	2^{nd} – 10^{th}	<-43
1878.98	1000	2^{nd} – 10^{th}	<-43
1909.92	1998	2^{nd} – 10^{th}	<-43

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.

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 64 of 71.

NAME OF TEST: Field Strength of Spurious Radiation
g9930295: 1999-Mar-29 Mon 10:35:00
STATE: 1:Low Power AMPS-FM

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	ERP, dBm	MARGIN, dB
836.400000	1672.800000	38.67	1.86	106.29	-56.85	-43.9
836.400000	2509.200000	33.33	6.46	97.61	-57.55	-44.6
836.400000	3345.600000	31.67	8.55	102.57	-57.15	-44.2
836.400000	4182.000000	31	10.66	121.06	-55.75	-42.7
836.400000	5018.400000	30.67	12.95	151.71	-53.75	-40.8
836.400000	5854.800000	30	15.07	179.27	-52.35	-39.3
836.400000	6691.200000	33.33	18.23	378.44	-45.85	-32.8
836.400000	7527.600000	30.33	19.6	313.69	-47.45	-34.5
836.400000	8364.000000	31.17	20.04	363.5	-46.15	-33.2

NAME OF TEST: Field Strength of Spurious Radiation
g9930294: 1999-Mar-29 Mon 09:15:00
STATE: 2:High Power AMPS-FM

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	ERP, dBm	MARGIN, dB
836.400000	1672.805000	47.5	31.86	9289.66	-18.05	-5
836.400000	2509.191667	62.5	6.46	2805.43	-28.45	-15.4
836.400000	3345.605000	45	8.55	475.88	-43.85	-30.9
836.400000	4182.026667	39.33	10.66	315.86	-47.35	-34.4
836.400000	5018.383333	37.5	12.95	333.04	-46.95	-34
836.400000	5854.800000	30.5	15.07	189.89	-51.85	-38.8
836.400000	6691.200000	31.83	18.23	318.42	-47.35	-34.3
836.400000	7527.600000	33.33	19.6	443.1	-44.45	-31.5
836.400000	8364.000000	33.33	20.04	466.12	-44.05	-31

PAGE NO. 65 of 71.

NAME OF TEST: Field Strength of Spurious Radiation
g9930293: 1999-Mar-29 Mon 09:10:00
STATE: 1:Low Power AMPS-TDMA

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	ERP, dBm	MARGIN, dB
836.400000	1672.803333	29.67	1.86	37.71	-65.85	-52.9
836.400000	2509.203333	31.5	6.46	79.07	-59.45	-46.4
836.400000	3345.603333	31.5	8.55	100.58	-57.35	-44.4
836.400000	4182.003333	30.67	10.66	116.55	-56.05	-43.1
836.400000	5018.403333	30	12.95	140.44	-54.45	-41.5
836.400000	5854.803333	30	15.07	179.27	-52.35	-39.3
836.400000	6691.203333	31.67	18.23	312.61	-47.45	-34.5
836.400000	7527.603333	30.17	19.6	307.96	-47.65	-34.6
836.400000	8364.003333	30	20.04	317.69	-47.35	-34.4

NAME OF TEST: Field Strength of Spurious Radiation
g9930292: 1999-Mar-26 Fri 14:02:00
STATE: 2:High Power AMPS-TDMA

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	ERP, dBm	MARGIN, dB
836.400000	1672.803333	49.83	31.86	12147.87	-15.65	-2.7
836.400000	2509.220000	66.33	6.46	4360.14	-24.55	-11.6
836.400000	3345.598333	51.5	8.55	1005.77	-37.35	-24.4
836.400000	4182.011667	39.17	10.66	310.1	-47.55	-34.6
836.400000	5018.398333	32.17	12.95	180.3	-52.25	-39.3
836.400000	5854.798333	30.33	15.07	186.21	-51.95	-39
836.400000	6691.198333	29.67	18.23	248.31	-49.45	-36.5
836.400000	7527.598333	30.17	19.6	307.96	-47.65	-34.6
836.400000	8363.998333	31.67	20.04	385.03	-45.65	-32.7

PAGE NO. 66 of 71.

NAME OF TEST: Field Strength of Spurious Radiation
g9930291: 1999-Mar-26 Fri 13:58:00
STATE: 1:Low Power PCS-TDMA

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN, dB
1879.980000	3759.960000	30.5	9.56	100.69	-55.2	-42.1
1879.980000	5639.940000	29	14.55	150.49	-51.7	-38.7
1879.980000	7519.920000	27.17	19.59	217.77	-48.5	-35.4
1879.980000	9399.900000	27.33	22.96	326.96	-44.9	-31.9
1879.980000	11279.880000	28.33	23.84	405.98	-43.1	-30
1879.980000	13159.860000	28	26.89	555.26	-40.3	-27.3
1879.980000	15039.840000	29.67	23.51	456.04	-42.0	-29
1879.980000	16919.820000	27.5	30.35	780.73	-37.4	-24.4

NAME OF TEST: Field Strength of Spurious Radiation
g9930290: 1999-Mar-26 Fri 10:52:00
STATE: 2:High Power PCS-TDMA

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	EIRP, dBm	MARGIN, dB
1879.980000	3759.973333	70.5	9.56	10069.32	-15.2	-2.1
1879.980000	5639.973333	57	14.55	3780.07	-23.7	-10.7
1879.980000	7519.926667	45.33	19.59	1761.98	-30.3	-17.3
1879.980000	9399.945000	40.67	22.96	1518.8	-31.6	-18.6
1879.980000	11279.925000	28.83	23.84	430.03	-42.6	-29.5
1879.980000	13159.905000	28	26.89	555.26	-40.3	-27.3
1879.980000	15039.885000	28	23.51	376.27	-43.7	-30.7
1879.980000	16919.865000	27.67	30.35	796.16	-37.2	-24.2

PAGE NO. 67 of 71.

NAME OF TEST: Frequency Stability (Temperature Variation)

SPECIFICATION: 47 CFR 2.1055(a)(1)

GUIDE: TIA/EIA/IS-137-A-1996

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. 68 of 71.

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

TEST SAMPLE (1) (2) POWER SUPPLY (3) (4)

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

FREQUENCY STABILITY (AMPS-FM)

TEMP. °C	Change, Hz	Change, ppm
-30	962	1.2
-20	769	0.9
-10	418	0.5
0	293	0.4
10	268	0.3
20	276	0.3
25	544	0.7
30	519	0.6
40	560	0.7
50	736	0.9
60	828	1.0

FREQUENCY STABILITY (AMPS-TDMA)

TEMP. °C	Change, Hz	Change, ppm
-30	-5	0.0
-20	-12	0.0
-10	-11	0.0
0	-15	0.0
10	4	0.0
20	-8	0.0
25	-8	0.0
30	-3	0.0
40	2	0.0
50	-11	0.0
60	-4	0.0

FREQUENCY STABILITY (PCS-TDMA)

TEMP. °C	Change, Hz	Change, ppm
-30	5	0.0
-20	2	0.0
-10	-3	0.0
0	5	0.0
10	0	0.0
20	7	0.0
25	-13	0.0
30	3	0.0
40	20	0.0
50	-1	0.0
60	7	0.0

SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 70 of 71.

NAME OF TEST: Frequency Stability (Voltage Variation)

SPECIFICATION: 47 CFR 2.1055 (b)(1)

GUIDE: TIA/EIA/IS-137-A-1996

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT was placed in a temperature chamber at 25±5°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.

RESULTS: Frequency Stability (Voltage Variation)

STATE: 0:General AMPS-FM MODE

LIMIT, ppm = 2.5
LIMIT, Hz = 2091
BATTERY END POINT (Voltage) = 3.1

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	3.3	836.400502	502	0.6
100	3.9	836.500544	544	0.7
115	4.5	836.400585	585	0.7
B.E.P.	3.1	836.400481	481	0.6

RESULTS: Frequency Stability (Voltage Variation)

STATE: 0:General AMPS-TDMA MODE

LIMIT, ppm = 2.5
LIMIT, Hz = 2091
BATTERY END POINT (Voltage) = 3.1

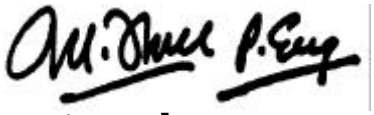
% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	3.3	836.399997	-3	0.0
100	3.9	836.399992	-8	0.0
115	4.5	836.399989	-11	0.0
B.E.P.	3.1	836.399986	-14	0.0

RESULTS: Frequency Stability (Voltage Variation)

STATE: 0:General PCS-TDMA MODE

LIMIT, ppm = 2.5
LIMIT, Hz = 4700
BATTERY END POINT (Voltage) = 3.1

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	3.3	1879.979982	-18	0.0
100	3.9	1879.979987	-13	0.0
115	4.5	1879.980012	12	0.0
B.E.P.	3.1	1879.979994	-6	0.0



SUPERVISED BY: Morton Flom, P. Eng.

PAGE NO. 71 of 71.

NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 40K0F8W
NECESSARY BANDWIDTH:
NECESSARY BANDWIDTH (B_N), kHz = 40
(measured at the 99.75% power bandwidth)

MODULATION = 40K0F1D
NECESSARY BANDWIDTH:
NECESSARY BANDWIDTH (B_N), kHz = 40
(measured at the 99.75% power bandwidth)

MODULATION = 30K0DXW
NECESSARY BANDWIDTH:
NECESSARY BANDWIDTH (B_N), kHz = 30
(measured at the 99.75% power bandwidth)

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: Morton Flom, P. Eng.