



M. Flom Associates, Inc. - Global Compliance Center

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Date: May 23, 2002

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Honeywell International Inc.
Equipment: Commercial Electronic Systems Inc. - Phoenix
FCC ID: HS-600
FCC Rules: GB8HS-600
FCC Rules: 87 and Confidentiality

Gentlemen:

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

Filing fees are attached.

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

Sincerely yours,

A handwritten signature in black ink, appearing to read 'M. Flom P. Eng.' The signature is written in a cursive style with a horizontal line underneath it.

Morton Flom, P. Eng.

enclosure(s)
cc: Applicant
MF/cvr

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

APPLICANT: Honeywell International Inc.
Commercial Electronic Systems Inc. - Phoenix

FCC ID: GB8HS-600

BY APPLICANT:

1. LETTER OF AUTHORIZATION	x
2. IDENTIFICATION DRAWINGS, 2.1033(c)(11)	
<input checked="" type="checkbox"/> LABEL	
<input checked="" type="checkbox"/> LOCATION OF LABEL	
<input checked="" type="checkbox"/> COMPLIANCE STATEMENT	
<input checked="" type="checkbox"/> LOCATION OF COMPLIANCE STATEMENT	
3. PHOTOGRAPHS, 2.1033(c)(12)	x
4. DOCUMENTATION: 2.1033(c)	
(3) USER MANUAL	x
(9) TUNE UP INFO	x
(10) SCHEMATIC DIAGRAM	x
(10) CIRCUIT DESCRIPTION	x
BLOCK DIAGRAM	x
PARTS LIST	x
ACTIVE DEVICES	x
5. MPE Report	x

BY M.F.A. INC.

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



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T R A N S M I T T E R C E R T I F I C A T I O N

of

FCC ID: GB8HS-600
MODEL: HS-600

to

FEDERAL COMMUNICATIONS COMMISSION

Rule Part(s) 87 and Confidentiality

DATE OF REPORT: May 23, 2002

ON THE BEHALF OF THE APPLICANT:

Honeywell International Inc.
Commercial Electronic Systems Inc. - Phoenix

AT THE REQUEST OF:

P.O. X303785L-06B

Honeywell Inc.
Aerospace Electronic Systems
5353 West Bell Road
Glendale, AZ 85038-9000

Attention of:

Charles Dosdall, Technical Manager, RF Systems
email: charlie.dosdall@honeywell.com
(602) 436-4653

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.

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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: d0250042

d) Client: Honeywell Inc.
Aerospace Electronic Systems
5353 West Bell Road
Glendale, AZ 85038-9000

e) Identification: HS-600
FCC ID: GB8HS-600
EUT Description: Inmarsat Aircraft Telecommunications System

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

g) Report Date: May 16, 2002
EUT Received: April 8, 2002

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.

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SUMMARY OF TEST RESULTS

<u>Rule Parts</u>	<u>Subparts</u>	<u>Results</u>
1.1310	RF Radiation Exposure	Minimum Safe Distance = 36 cm
2.1091	R.F. Radiation Mobile/Fixed Exposure	Minimum Safe Distance = 36 cm
2.1046, 87.131	R.F. Power Output	40 Watts (Rated) 40.36 Watts(Measured)
2.1047, 87.131	Modulation Characteristics	21K0G1D (BPSK) 38K0D1W (16 QAM)
2.1049, 87.135(c)	Occupied Bandwidth	Meets Limits; Remains Within the Band
2.1051, 87.131	Spurious Emissions, Conducted	< -62 dbc (Limit -59 dbc)
2.1053, 87.131	Spurious Emissions, Radiated	-78.4 dbc; <23 x 10 ⁻⁶ Watts, WORST CASE
2.1055, 87.133	Frequency Stability	+30 Hz, 0.018 ppm -50 Hz, 0.030 ppm WORST CASE

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LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATIONIN ACCORDANCE WITH FCC RULES AND REGULATIONS,
VOLUME II, PART 2 AND TO

87 and Confidentiality

Sub-part 2.1033

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

Honeywell International Inc.
Commercial Electronic Systems Inc. - Phoenix
2111 North 19th Avenue
Phoenix, AZ 85027

MANUFACTURER:

Honeywell International
5353 West Bell Road
Glendale, AZ 85308

(c)(2): FCC ID: GB8HS-600MODEL NO: HS-600(c)(3): INSTRUCTION MANUAL(S):

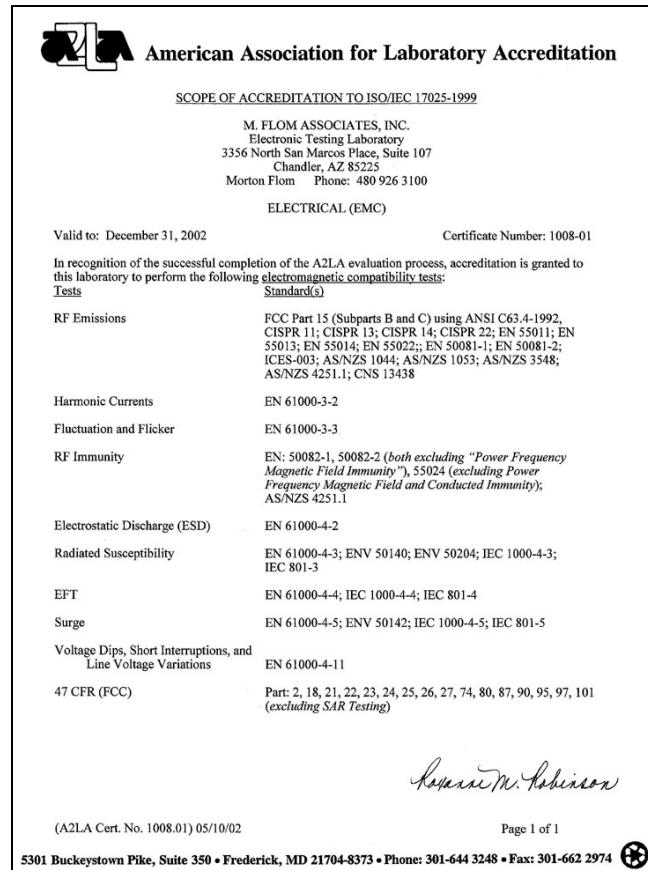
PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 21K0G1D (BPSK)
38K0D1W (16 QAM)(c)(5): FREQUENCY RANGE, MHz: 1626.5 to 1660.5(c)(6): POWER RATING, Watts: 40
____ Switchable ____ Variable N/AFCC GRANT NOTE: BM - The output power is continuously variable from the value listed in this entry to 50%-55% of the value listed.(c)(7): MAXIMUM POWER RATING, Watts: 60DUT RESULTS: Passes Fails _____

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



"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 be covered by this laboratory's A2LA accreditation.

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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 = 28

(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

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Sub-part

2.1033(c)(14):TEST AND MEASUREMENT DATA

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts:

- ____ 21 - Domestic Public Fixed Radio Services
- ____ 22 - Public Mobile Services
- ____ 22 Subpart H - Cellular Radiotelephone Service
- ____ 22.901(d) - Alternative technologies and auxiliary services
- ____ 23 - International Fixed Public Radiocommunication services
- ____ 24 - Personal Communications Services
- ____ 74 Subpart H - Low Power Auxiliary Stations
- ____ 80 - Stations in the Maritime Services
- ____ 80 Subpart E - General Technical Standards
- ____ 80 Subpart F - Equipment Authorization for Compulsory Ships
- ____ 80 Subpart K - Private Coast Stations and Marine Utility Stations
- ____ 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
- ____ 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
- ____ 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
- ____ 80 Subpart V - Emergency Position Indicating Radiobeacons (EPIRB'S)
- ____ 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
- ____ 80 Subpart X - Voluntary Radio Installations
- x 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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STANDARD TEST CONDITIONS
and
ENGINEERING PRACTICES

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

In accordance with ANSI C63.4-1992/2000 Draft, 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. 8 of 37.
NAME OF TEST: Carrier Output Power (Conducted)
SPECIFICATION: 47 CFR 2.1046(a)
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.1
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
(Worst case)

FREQUENCY OF CARRIER, MHz = 1643.5, 1626.5, 1660.5

POWER SETTING	R. F. POWER, WATTS
High	40

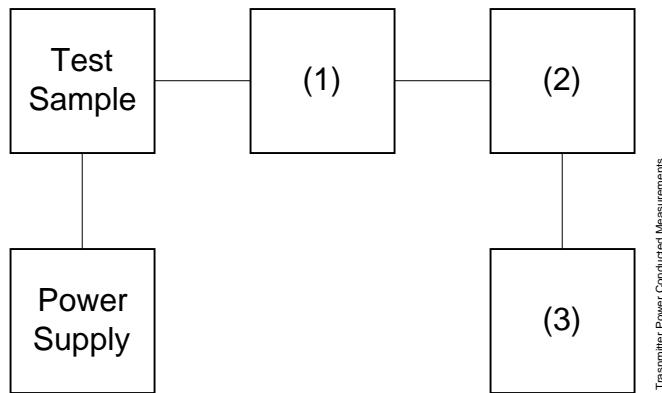
PERFORMED BY: 
Doug Noble, B.A.S. E.E.T.

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TRANSMITTER POWER CONDUCTED MEASUREMENTS

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



Transmitter Power Conducted Measurements

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

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NAME OF TEST:

ERP Carrier Power (Radiated)

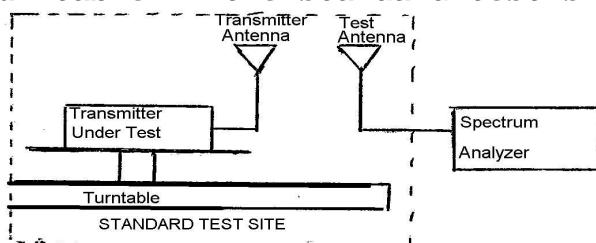
SPECIFICATION:

TIA/EIA 603A (Substitution Method)

2.2.17.1 Definition: The average radiated power of a licensed device is the equivalent power required, when delivered to a half-wave dipole or horn antenna, to produce at a distant point the same average received power as produced by the licensed device.

2.2.17.2 Method of Measurement:

a) Connect the equipment as illustrated. Place the transmitter to be tested on the turntable in the standard test site.



b) Raise and lower the test antenna from 1m to 6 m with the transmitter facing the antenna and record the highest received signal in dB as LVL.

c) Repeat step b) for seven additional readings at 45° interval positions of the turntable.

d) Replace the transmitter under test with a half-wave or horn vertically polarized antenna. The center of the antenna should be at the same location as the transmitter under test. Connect the antenna to a signal generator with a known output power and record the path loss in dB or LOSS.

e) Calculate the average radiated output power from the readings in step c) and d) by the following:

$$\text{average radiated power} = 10 \log_{10} \sum 10(\text{LVL} - \text{LOSS})/10 \text{ (dBm)}$$

	RESULTS					
	1626.5 MHz		1643.5 MHz		1660.5 MHz	
	LVL, dbm	Path Loss, db	LVL, dbm	Path Loss, db	LVL, dbm	Path Loss, db
0°	47.3	- 0.8	42.3	- 0.2	47.9	+ 0.6
45°	44.6	- 0.8	42.0	- 0.2	45.5	+ 0.6
90°	47.3	- 0.8	43.6	- 0.2	42.7	+ 0.6
135°	43.7	- 0.8	47.1	- 0.2	43.2	+ 0.6
180°	43.4	- 0.8	38.0	- 0.2	44.9	+ 0.6
225°	44.5	- 0.8	41.4	- 0.2	41.7	+ 0.6
270°	46.5	- 0.8	48.2	- 0.2	43.8	+ 0.6
315°	40.9	- 0.8	36.7	- 0.2	43.8	+ 0.6

	1626.5 MHz	1643.5 MHz	1660.5 MHz
Av. Radiated Power:	45.6 dbm	42.6 dbm	43.6 dbm

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)

SPECIFICATION: 47 CFR 2.1051

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

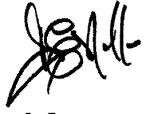
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

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

FREQUENCY OF CARRIER, MHz = 1643.5, 1626.5, 1660.5
SPECTRUM SEARCHED, GHz = 0 to 10 x F_c
MAXIMUM RESPONSE, Hz = N/A
ALL OTHER EMISSIONS = \geq 20 dB BELOW LIMIT

PERFORMED BY:

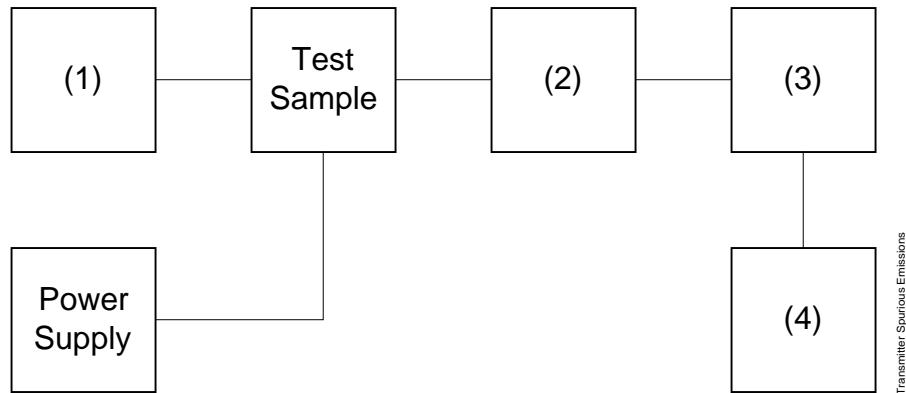

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TRANSMITTER SPURIOUS EMISSION

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



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

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NAME OF TEST:

Unwanted Emissions (Transmitter Conducted)

LIMIT(S), dBc

 $-(43+10x\log P) = -59$ (40 Watts)

g0240053: 2002-Apr-10 Wed 13:20:00

STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
1626.500000	3252.904900	-37.3	-83.4	-24.3
1643.500000	3287.086600	-37.4	-83.5	-24.4
1660.500000	3320.767700	-36.7	-82.8	-23.7
1626.500000	4879.712800	-37.1	-83.2	-24.1
1643.500000	4930.278200	-37.2	-83.3	-24.2
1660.500000	4981.352800	-36.9	-83	-23.9
1626.500000	6506.080600	-30.3	-76.4	-17.3
1643.500000	6573.994000	-30.8	-76.9	-17.8
1660.500000	6641.755200	-30.7	-76.8	-17.7
1626.500000	8132.359300	-31.8	-77.9	-18.8
1643.500000	8217.681200	-31.3	-77.4	-18.3
1660.500000	8302.487000	-31.8	-77.9	-18.8
1626.500000	9758.905400	-30.4	-76.5	-17.4
1643.500000	9861.099100	-31.1	-77.2	-18.1
1660.500000	9963.172200	-31.4	-77.5	-18.4
1626.500000	11385.517500	-29.3	-75.4	-16.3
1643.500000	11504.390900	-30.6	-76.7	-17.6
1660.500000	11623.677700	-30.5	-76.6	-17.5
1626.500000	13012.115100	-26.3	-72.4	-13.3
1643.500000	13147.945700	-26.1	-72.2	-13.1
1660.500000	13284.228400	-27.1	-73.2	-14.1
1626.500000	14638.439200	-24.4	-70.5	-11.4
1643.500000	14791.654400	-24.3	-70.4	-11.3
1660.500000	14944.405800	-26.2	-72.3	-13.2
1626.500000	16265.077500	-24.7	-70.8	-11.7
1643.500000	16434.877900	-25	-71.1	-12
1660.500000	16604.952600	-25.7	-71.8	-12.7
1626.500000	17891.492100	-25.2	-71.3	-12.2
1643.500000	18078.580900	-25.5	-71.6	-12.5
1660.500000	18265.277600	-24.1	-70.2	-11.1

PERFORMED BY:

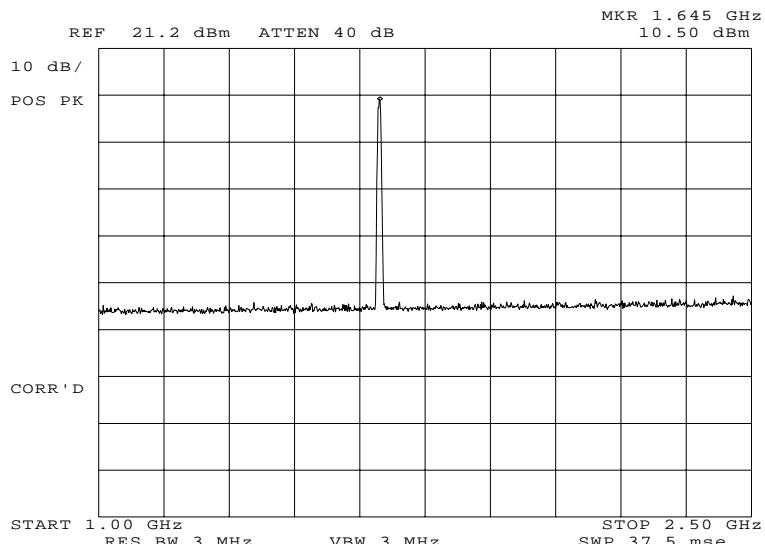


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NAME OF TEST: Transmitter Conducted Spurious Emissions
 g0240050: 2002-Apr-10 Wed 13:09:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: 16 QAM 33.6 KILO SYMBOLS PER SECOND
 TRANSMITTER SPURS 1 - 2.5 GHZ
 Rule Parts 2.1051 and 87.131

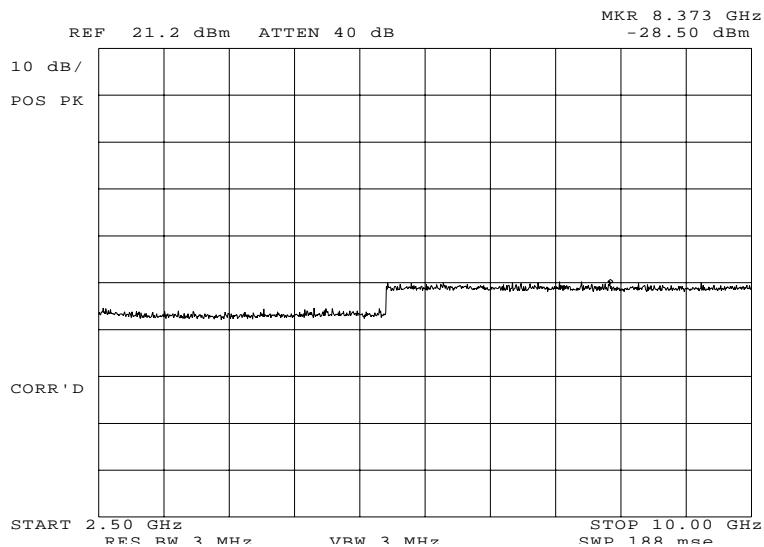
PERFORMED BY:


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NAME OF TEST: Transmitter Conducted Spurious Emissions
 g0240051: 2002-Apr-10 Wed 13:10:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: 16 QAM 33.6 KILO SYMBOLS PER SECOND
 TRANSMITTER SPURS 2.5 - 10 GHZ
 Rule Parts 2.1051 and 87.131

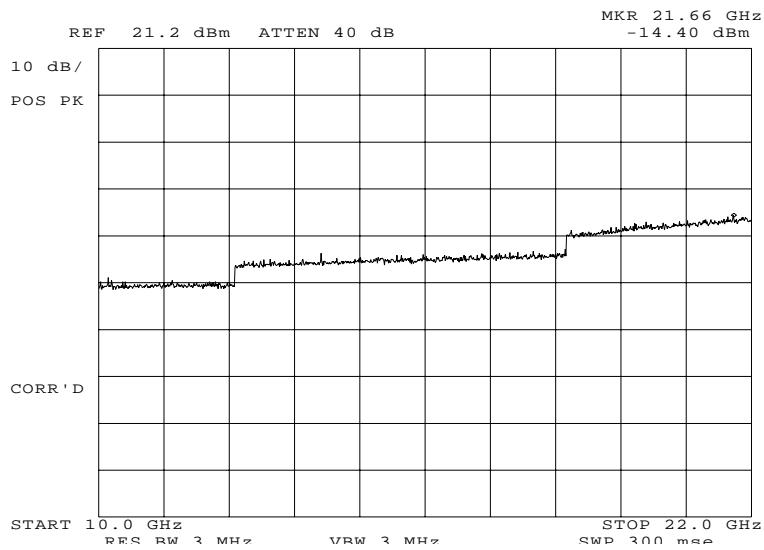
PERFORMED BY:


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NAME OF TEST: Transmitter Conducted Spurious Emissions
 g0240052: 2002-Apr-10 Wed 13:11:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: 16 QAM 33.6 KILO SYMBOLS PER SECOND
 TRANSMITTER SPURS 10 - 22 GHZ
 Rule Parts 2.1051 and 87.131

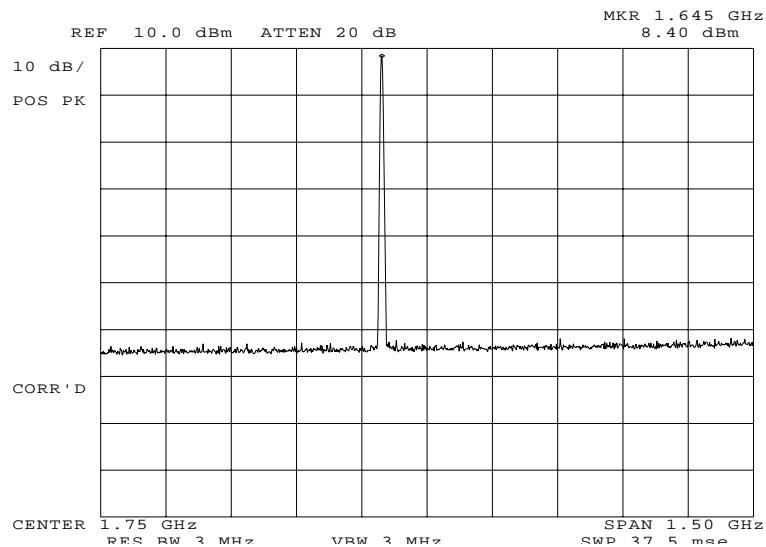
PERFORMED BY:


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PAGE NO.

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NAME OF TEST: Transmitter Conducted Spurious Emissions
 g0240058: 2002-Apr-10 Wed 14:27:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: TDMA @ 1643.5 MHZ
 TRANSMITTER SPURS 1 - 2.5 GHZ
 Rule Parts 2.1051 and 87.131

PERFORMED BY:

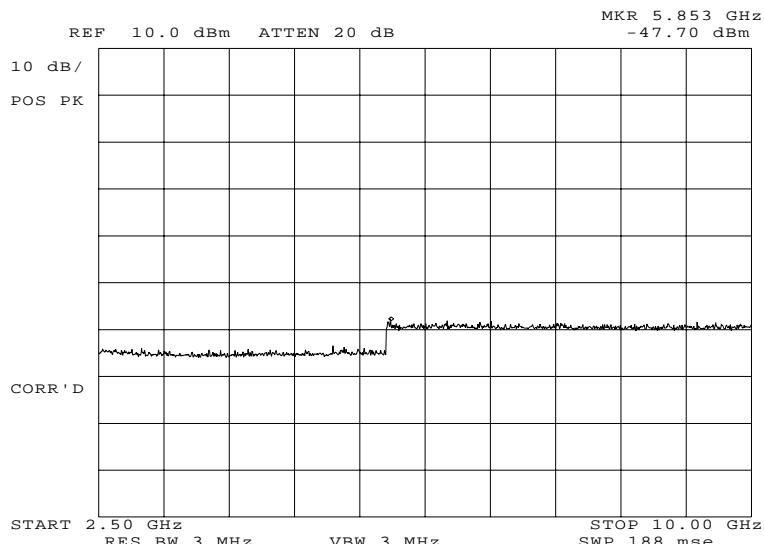


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NAME OF TEST: Transmitter Conducted Spurious Emissions
 g0240059: 2002-Apr-10 Wed 14:28:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: TDMA @ 1643.5 MHZ
 TRANSMITTER SPURS 2.5 - 10 GHZ
 Rule Parts 2.1051 and 87.131

PERFORMED BY:

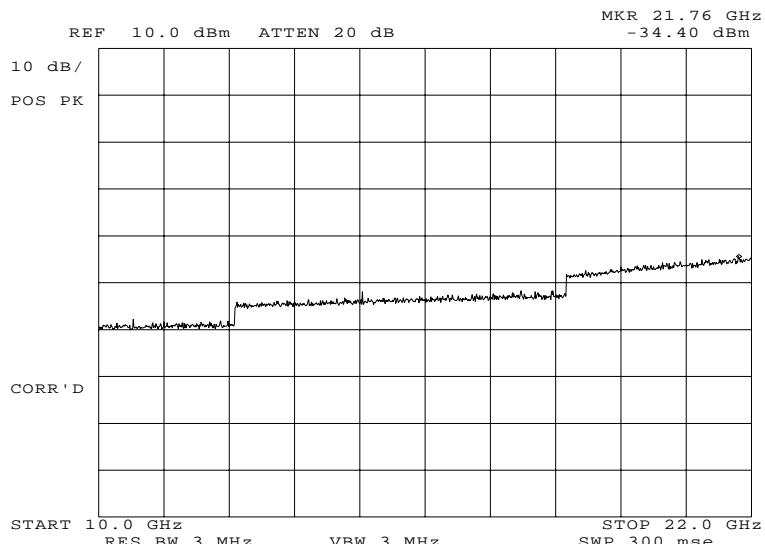


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PAGE NO.

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NAME OF TEST: Transmitter Conducted Spurious Emissions
 g0240060: 2002-Apr-10 Wed 14:29:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: TDMA @ 1643.5 MHZ
 TRANSMITTER SPURS 10 - 22 GHZ
 Rule Parts 2.1051 and 87.131

PERFORMED BY:


 Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

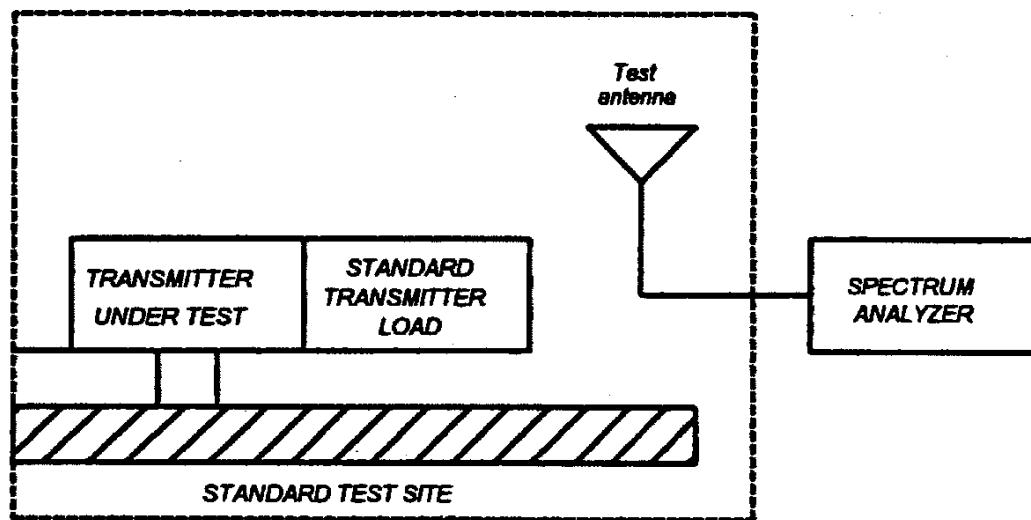
GUIDE: ANSI/TIA/EIA-603-1992/2001, Paragraph 1.2.12 and Table 16, 47 CFR 22.917

MEASUREMENT PROCEDURE

1.2.12.1 Definition: Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

1.2.12.2 Method of Measurement

- A) Connect the equipment as illustrated
- B) Adjust the spectrum analyzer for the following settings:
 - 1) Resolution Bandwidth 100 kHz (<1 GHZ), 1 MHZ (> 1GHz).
 - 2) Video Bandwidth \geq 3 times Resolution Bandwidth, or 30 kHz (22.917)
 - 3) Sweep Speed \leq 2000 Hz/second
 - 4) Detector Mode = Mean or Average Power
- C) Place the transmitter to be tested on the turntable in the standard test site. The transmitter is transmitting into a non-radiating load which is placed on the turntable. The RF cable to this load should be of minimum length.



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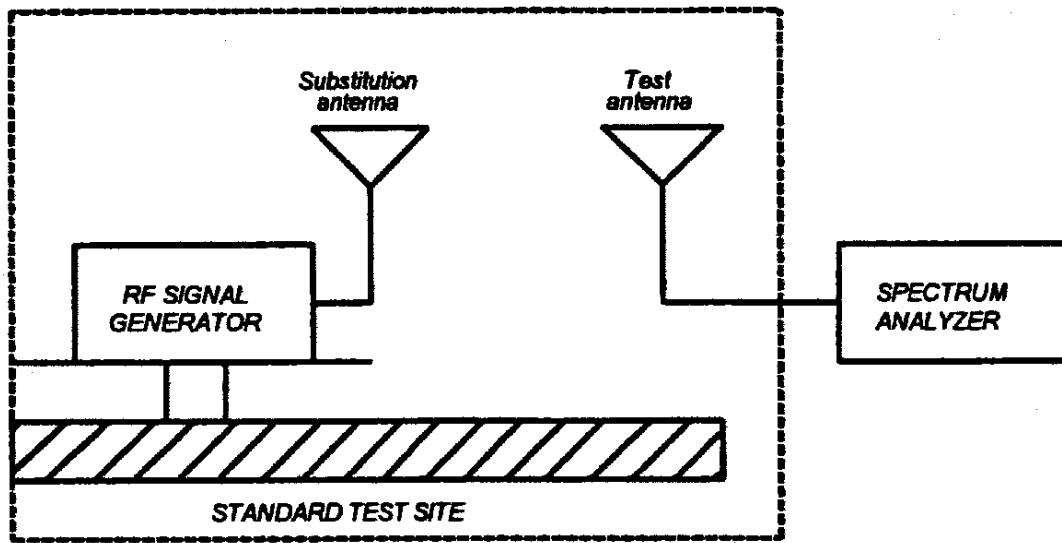
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NAME OF TEST: Field Strength of Spurious Radiation (Cont.)

D) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to \pm the test bandwidth (see section 1.3.4.4).

E) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.

F) Repeat step E) for each spurious frequency with the test antenna polarized vertically.



G) Reconnect the equipment as illustrated.

H) Keep the spectrum analyzer adjusted as in step B).

I) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

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NAME OF TEST: Field Strength of Spurious Radiation (Cont.)

J) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

K) Repeat step J) with both antennas vertically polarized for each spurious frequency.

L) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.

M) The levels recorded in step L) are absolute levels of radiated spurious emissions in dBm. The radiated spurious emissions in dB can be calculated by the following:

Radiated spurious emissions dB =
 $10\log_{10}(\text{TX power in watts}/0.001) - \text{the levels in step 1}$

NOTE: It is permissible that other antennas provided can be referenced to a dipole.

Test Equipment:

Asset	Description (as applicable)	s/n	Cycle	Last Cal
				Per ANSI C63.4-1992/2000 Draft, 10.1.4
<u>TRANSDUCER</u>				
i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Sep-01
i00065	EMCO 3301-B Active Monopole	2635	12 mo.	Sep-01
i00089	Aprel 2001 200MHz-1GHz	001500	12 mo.	Sep-01
i00103	EMCO 3115 1GHz-18GHz	9208-3925	12 mo.	Sep-01
<u>AMPLIFIER</u>				
i00028	HP 8449A	2749A00121	12 mo.	Mar-02
<u>SPECTRUM ANALYZER</u>				
i00029	HP 8563E	3213A00104	12 mo.	Jan-02
i00033	HP 85462A	3625A00357	12 mo.	Jan-02
i00048	HP 8566B	2511AD1467	6 mo.	Jan-02
<u>MICROPHONE, ANTENNA PORT, AND CABLING</u>				
Microphone	Yes/No	<u>N</u>	Cable Length	<u>1.0</u> Meters
Antenna Port Terminated	Yes/No	<u>Y</u>	Load	<u>N</u> Antenna Gain <u>0</u> dbd
All Ports Terminated by	Load	<u>N</u>	Peripheral	<u>N</u>

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NAME OF TEST:

Field Strength of Spurious Radiation

g0240034: 2002-Apr-08 Mon 14:05:00

STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	ERP, dBm	ERP, dbc
1643.500000	3286.775000	-35.5	≤ -79.4
1643.500000	4930.686666	-41.7	≤ -79.4
1643.500000	6573.920000	-44.6	≤ -79.4
1643.500000	8217.561666	-43	≤ -79.4
1643.500000	9861.011666	-37.3	≤ -79.4
1643.500000	11504.511666	-41.9	≤ -79.4
1643.500000	13148.011666	-38.2	≤ -79.4
1643.500000	14791.511666	-42.4	≤ -79.4
1643.500000	16435.011666	-38.4	≤ -79.4

SUPERVISED BY:


Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)

SPECIFICATION: 47 CFR 2.1049(c)(1)

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

TEST EQUIPMENT: As per previous page

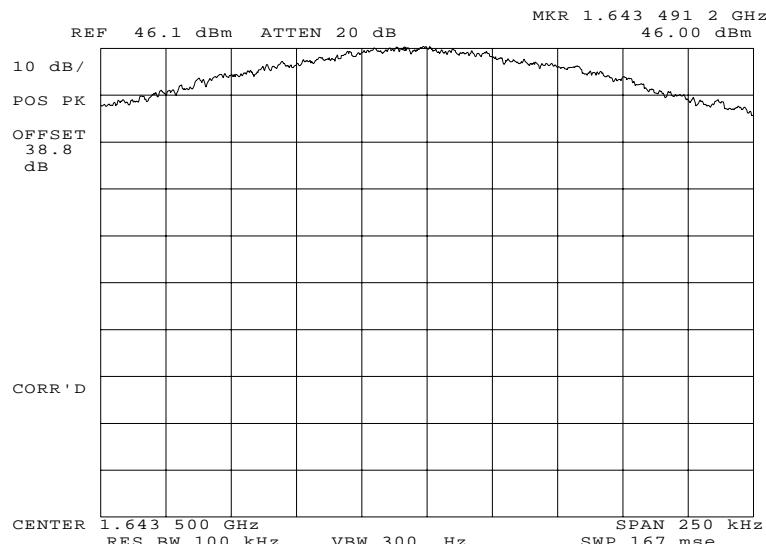
MEASUREMENT PROCEDURE

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 $\pm 2.5/\pm 1.25$ 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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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g0240046: 2002-Apr-10 Wed 13:00:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: 16 QAM 33.6 KILO SYMBOLS PER SECOND
 REFERENCE LEVEL

PERFORMED BY:

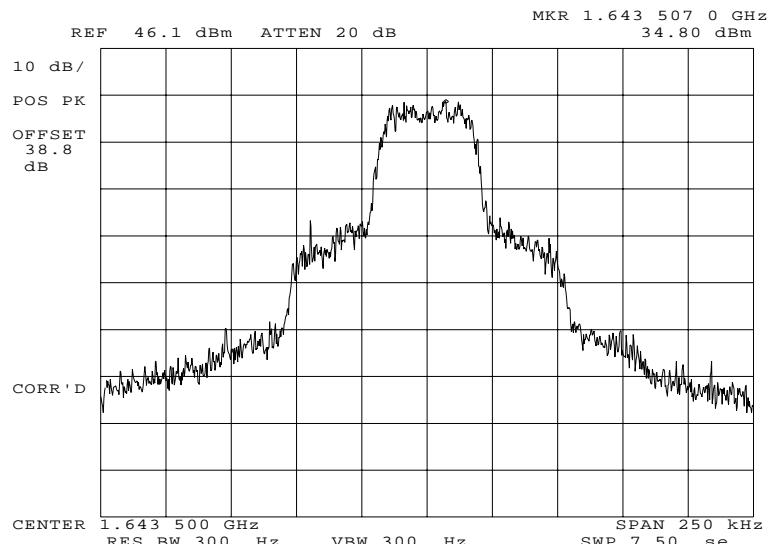


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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g0240047: 2002-Apr-10 Wed 13:02:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: 16 QAM 33.6 KILO SYMBOLS PER SECOND
 Rules 2.1049, 87.135(C)
 Emission Designator 38K0FD1W

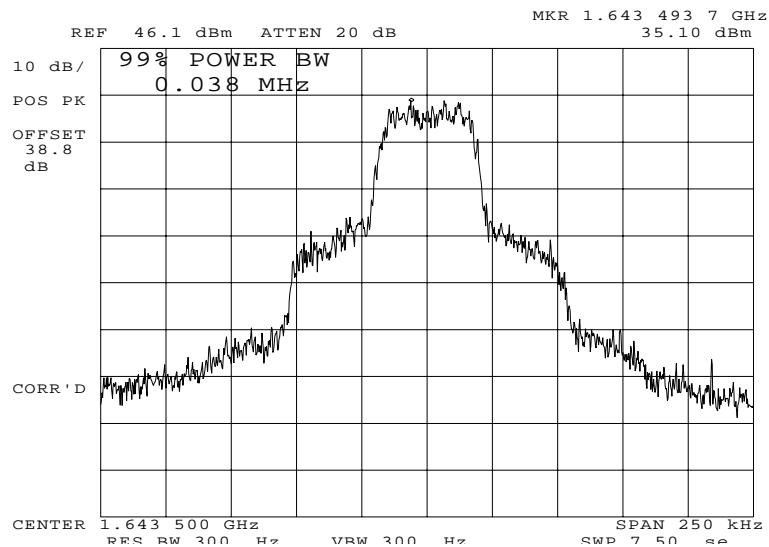
PERFORMED BY:


 Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g0240048: 2002-Apr-10 Wed 13:04:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: 16 QAM 33.6 KILO SYMBOLS PER SECOND
 99 % POWER BANDWIDTH
 Rules 2.1049, 87.135(C)

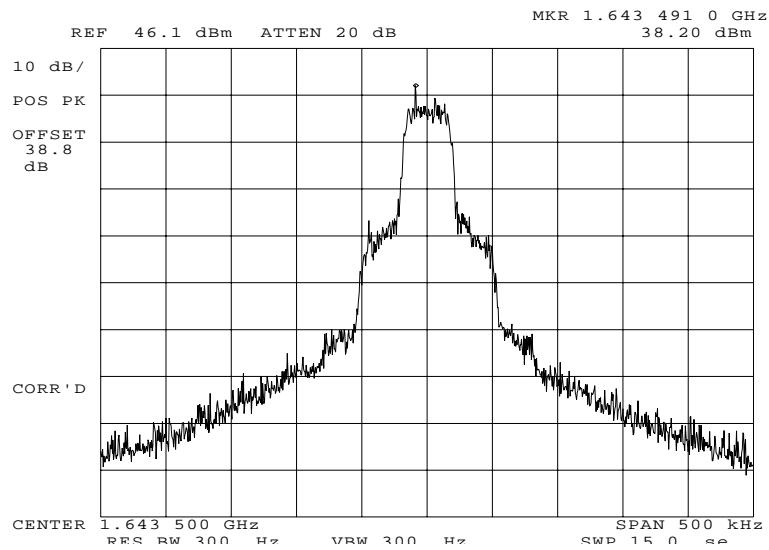
PERFORMED BY:


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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g0240049: 2002-Apr-10 Wed 13:06:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: 16 QAM 33.6 KILO SYMBOLS PER SECOND
 BANDWIDTH EDGES
 Rules 2.1049, 87.135(C)

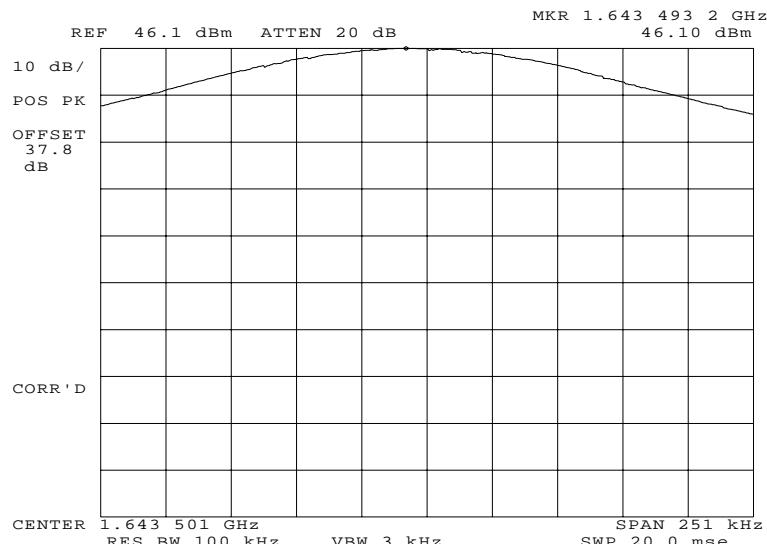
PERFORMED BY:


 Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g0240054: 2002-Apr-10 Wed 14:17:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: TDMA @ 1643.5 MHZ
 REFERENCE LEVEL
 Rule Parts 2.1051 and 87.131

PERFORMED BY:

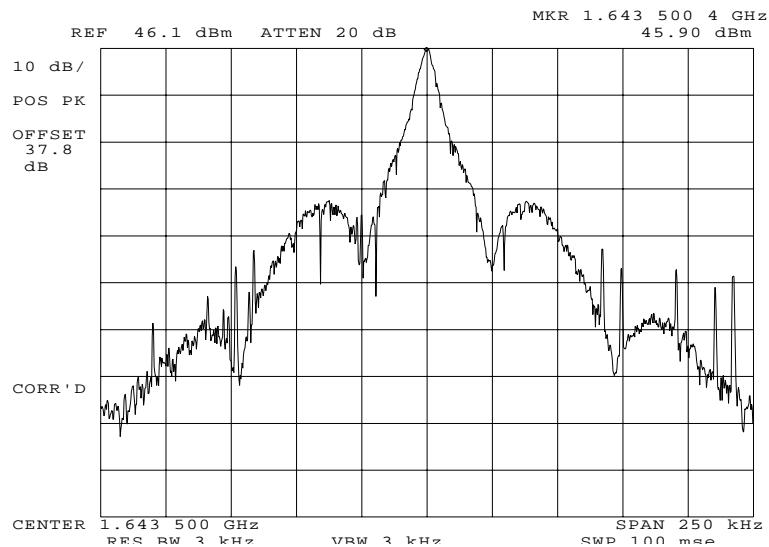


Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g0240055: 2002-Apr-10 Wed 14:21:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: TDMA @ 1643.5 MHZ
 Rule Parts 2.1049 and 87.135(c)
 Emission Designator: 21K0G1D

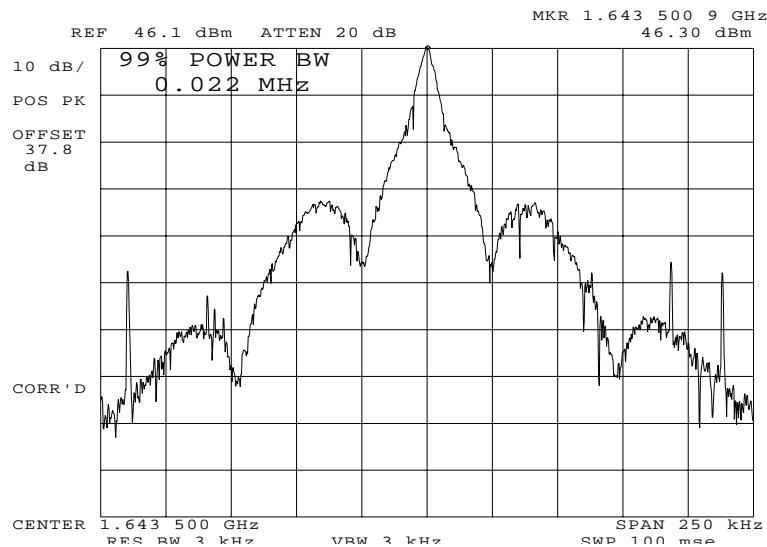
PERFORMED BY:


 Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g0240056: 2002-Apr-10 Wed 14:23:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: TDMA @ 1643.5 MHZ
 99 % POWER BANDWIDTH
 Rule Parts 2.1049 and 87.135(c)

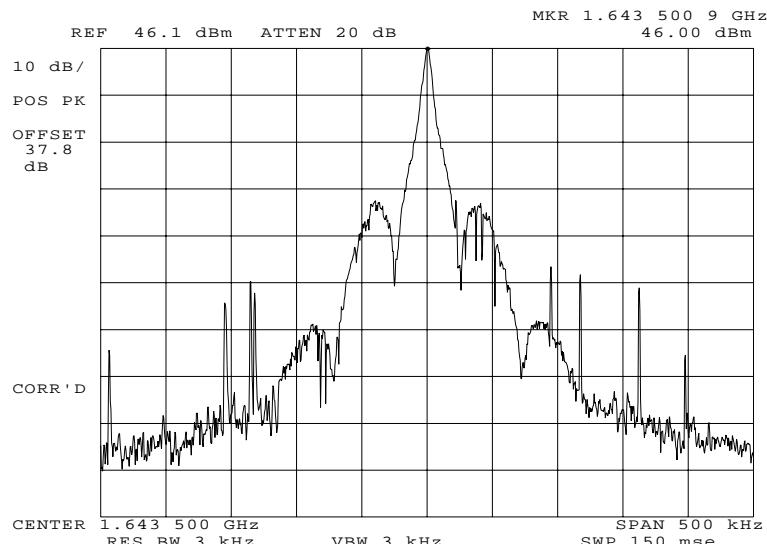
PERFORMED BY:


 Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
 g0240057: 2002-Apr-10 Wed 14:25:00
 STATE: 2:High Power



POWER: HIGH
 MODULATION: TDMA @ 1643.5 MHZ
 BANDWIDTH EDGES
 Rule Parts 2.1051 and 87.131

PERFORMED BY:



Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Frequency Stability (Temperature Variation)

SPECIFICATION: 47 CFR 2.1055(a)(1)

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

TEST CONDITIONS: As Indicated

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

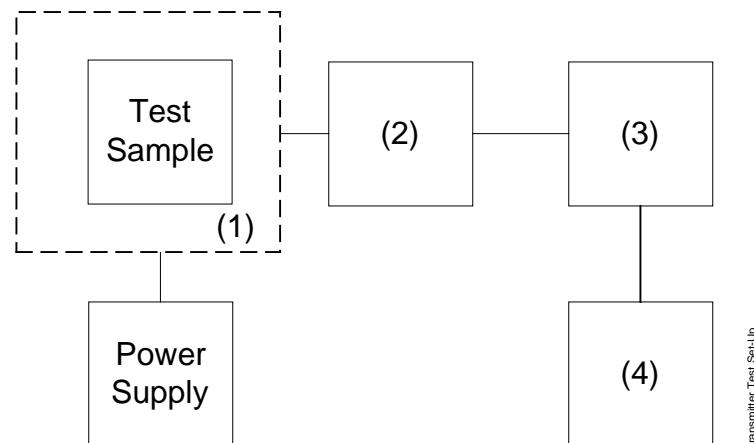
1. The EUT and test equipment were set up as shown on the following page.
2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
3. With power OFF, the temperature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

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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



Transmitter Test Set Up

Asset Description (as applicable)		s/n
(1) TEMPERATURE, HUMIDITY, VIBRATION		
i00027 Tenney Temp. Chamber	9083-765-234	
i00 Weber Humidity Chamber		
i00 L.A.B. RVH 18-100		
(2) COAXIAL ATTENUATOR		
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	
i00039 HP 436A POWER METER	2709A26776	
i00020 HP 8901A POWER MODE	2105A01087	
(4) FREQUENCY COUNTER		
i00042 HP 5383A	1628A00959	
i00019 HP 5334B	2704A00347	
i00020 HP 8901A	2105A01087	

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NAME OF TEST:

Frequency Stability (Temperature Variation)

<u>TEMPERATURE °C</u>		<u>Change Hz</u>
-20	1.64350002	+0.02
-10	1.64350003	+0.03
0	1.64350002	+0.02
10	1.64350001	+0.01
20	1.64349999	-0.01
25	1.64349998	-0.02
30	1.64349998	-0.02
40	1.64349997	-0.03
50	1.64349996	-0.04
50	1.64344995	-0.05

PERFORMED BY:


Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Frequency Stability (Voltage Variation)

SPECIFICATION: 47 CFR 2.1055(d)(1)

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

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT was placed in a temperature chamber at $25\pm5^{\circ}\text{C}$ 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.

RESULTS: Frequency Stability (Voltage Variation)

AC

% of STV	Voltage	Change, Hz
115	132.05	+0.01
100	115	+0.02
85	96.95	+0.01

DC

% of STV	Voltage	Change, ppm
115	32.2	+0.01
100	28	0
85	23.8	+0.01

PERFORMED BY:


Doug Noble, B.A.S. E.E.T.

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NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 21K0G1D

NECESSARY BANDWIDTH CALCULATION:

MAXIMUM MODULATION (M), kHz	= 6
MAXIMUM DEVIATION (D), kHz	= 5
CONSTANT FACTOR (K)	= 1
NECESSARY BANDWIDTH (B _N), kHz	= (2xM)+(2xDxK)
	= 22 (BPSK, Measured)

MODULATION = 38K0D1W

NECESSARY BANDWIDTH CALCULATION:

MAXIMUM MODULATION (M), kHz	= 14
MAXIMUM DEVIATION (D), kHz	= 5
CONSTANT FACTOR (K)	= 1
NECESSARY BANDWIDTH (B _N), kHz	= (2xM)+(2xDxK)
	= 38 (16 QAM, Measured)

PERFORMED BY:



Doug Noble, B.A.S. E.E.T.

END OF TEST REPORT

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.