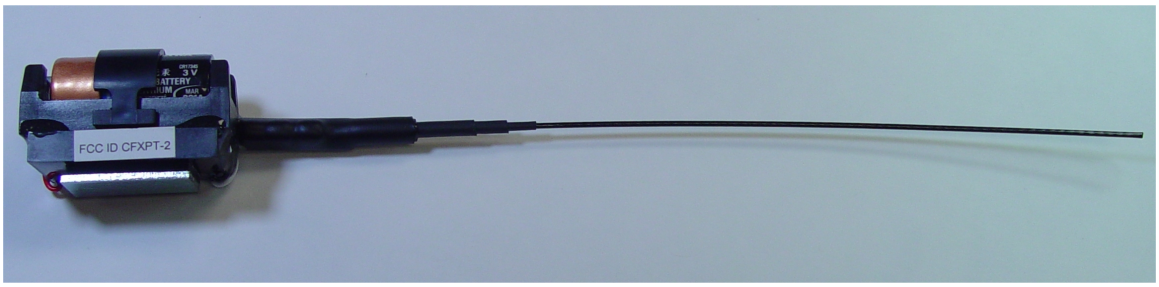
Owner's Manual

PT-2 LAW ENFORCEMENT TRACKING TRANSMITTER



INTRODUCTION

The Communications Specialists Model PT-2 transmitter is used as a homing device to locate persons or stolen goods under authority or agreement with a law enforcement agency (federal, state, or local) having jurisdiction in the area where it is placed. It is programmed at the factory to transmit on any one of 200 individual narrowband channels in the Low Power Radio Service (LPRS). This allows 200 transmitters to be used simultaneously in an area for unprecedented flexibility. Power output is 80 mW. It uses a widely available CR123A Lithium battery which transmits continuously for 12 days or a rechargeable battery which transmits continuously for 6 days. The battery snaps into a holder which is attached to the PT-2. A retainer snaps over the battery to hold it in under even the most demanding conditions. It is small in size (1.7"x1.2"x.9" without magnet) with an 8" attached loaded antenna. Its total weight is 1.5 oz. It includes a steel keeper on one side that allows the supplied rare earth magnet to keep it attached to the bottom of a vehicle or other item for quick and easy installation. For non magnetic use, the magnet need not be used. The PT-2 utilizes a TCXO rather than a fragile crystal so it is almost indestructible.

BATTERY INSTALLATION

Snap a CR123A battery into the battery holder. Be sure to observe the proper polarity by noting the diagram on the inside of the holder. If the battery is accidentally reversed, the PT-2 will not operate but it will not be damaged. Just pop out the battery and reverse it to resume operation. Snap the retainer over the battery to hold it in. Be sure to test the PT-2 on your receiver before use to ascertain that it is operating. To remove the battery, pry up the bottom edge of the retainer with a small screwdriver to pop it off.

FCC COMPLIANCE NOTICE

The PT-2 transmitter (FCC ID CFXPT-2) is authorized by rule under the Low Power Radio Service (47 C.F.R. Part 95) and must not cause harmful interference to TV reception or United States Navy SPASUR installations. You do not need an FCC license to operate this transmitter. This transmitter may only be used to provide: auditory assistance to persons with disabilities, persons who require language translation, or persons in educational settings; health care services to the ill; law enforcement tracking services under agreement with a law enforcement agency; or automated maritime telecommunications system (AMTS) network control communications. Two-way voice communications and all other types of uses not mentioned above are expressly prohibited.

CAUTION: Any changes or modifications to this device could void the user's authority to operate the equipment.

CHANNEL USE POLICY

The channels authorized to LPRS systems by the FCC rules are available on a shared basis only and will not be assigned for the exclusive use of any entity.

Those using LPRS transmitters must cooperate in the selection and use of channels in order to reduce interference and make the most effective use of the authorized facilities. Channels must be selected in an effort to avoid interference to other LPRS transmissions.

WARRANTY

The PT-2 is warranted to be free of defects in materials and workmanship for a period of one (1) year from the date of purchase. Just return the unit to the factory and we will repair or replace it at no charge.

COMMUNICATIONS SPECIALISTS, INC.
426 WEST TAFT AVENUE • ORANGE, CA 92865-4296
714.998.3021 • FAX 714.974.3420
*US & CANADA **800.854.0547** • FAX 800.850.0547*
www.com-spec.com e-mail: spence@com-spec.com

PT-2 DESCRIPTION OF CIRCUITRY

The PT-2 transmitter is a PLL synthesized design using a 1.0ppm TCXO as the reference oscillator.

A microprocessor controls all of the functions of the PLL, oscillator, and amplifier stages.

The circuit has a 1 stage VCO oscillator locked to the PLL, followed by 4 stages of amplification. Any harmonic or spurious signals are filtered out by a 5th order 230Mhz low pass filter before reaching the antenna.

PT-2 FACTORY TUNE UP PROCEDURE PRIOR TO POTTING

1. Download test firmware. This changes the PT-2 frequency to 216.000Mhz.
2. Adjust trimmer pot VR-01 to set the VCO frequency to 216.000Mhz (+ or - 20Hz).
3. With the frequency at 216.000Mhz, align VC-1 so the VCO test voltage is .3v (+ or - .1V).
4. Check power output to make sure it is 17.0dBm to 19.5dBm.
5. Check that all harmonics or spurious signals are at least 50dB down from main carrier.
6. Download test firmware to change the transmitting frequency to 222.000Mhz
7. Check that the VCO frequency is 222.000Mhz (+ or - 20Hz).
8. Check that the VCO test point is less than 1.7v.
9. Check that the power output is 17.0dBm to 19.5dBm.
10. Check that all harmonics or spurious signals are at least 50dB down from main carrier.

COMMUNICATIONS SPECIALISTS, INC.

426 West Taft Avenue • Orange, California 92865-4296

(714) 998-3021 • Fax (714) 974-3420
Entire U.S.A. (800) 854-0547 •Fax (800) 850-0547
http://www.com-spec.com

PART 95 ATTESTATION

June 3, 2005

Federal Communications Commission
Authorization & Evaluation Division
7345 Oakland Mills Road
Columbia, Maryland 21046

Gentlemen:

Reference: CFXPT-2

This equipment meets the Low Power Radio Service requirements of the FCC Rules, Part 95.

Programming of this product's transmitter power and its transmit frequencies can be performed ONLY by the manufacturer. The operator cannot increase transmitter power or program transmit frequencies using the equipment's external operation controls. (Rule 95.649)

Sincerely.

Communications Specialists, Inc.

Albert Spencer Porter
President

M. Flom Associates, Inc.
International Compliance Testing Laboratory
3356 N. San Marcos Place, Suite 107
Chandler, AZ 85225
toll-free: (866) 311-3268
fax: (480) 926-3598
http://www.mflom.com
info@mflom.com

Date: June 9, 2005

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Communication Specialists, Inc.
Equipment: PT-2
FCC ID: CFXPT-2
FCC Rules: 95G, 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,

Michael Schafer, Business Manager

enclosure(s)
cc: Applicant
DEL/del

M. Flom Associates, Inc.
International Compliance Testing Laboratory
3356 N. San Marcos Place, Suite 107
Chandler, AZ 85225
toll-free: (866) 311-3268
fax: (480) 926-3598
http://www.mflom.com
info@mflom.com

Transmitter Certification

of

FCC ID: CFXPT-2
Model: PT-2

to

Federal Communications Commission

Rule Part(s) 95G, Confidentiality

Date of report: June 9, 2005

On the Behalf of the Applicant:

Communication Specialists, Inc.

At the Request of: P.O. 050405PL

Communication Specialists, Inc.
426 W. Taft Ave
Orange, CA 92665-4296

Attention of: 1 800 854 0547; 714 998 3021; FAX: 714 974 3420
Spence Porter, President

Supervised by: Michael Findley, Laboratory Manager

List of Exhibits

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

Applicant: Communication Specialists, Inc.

FCC ID: CFXPT-2

By Applicant:

1. Letter of Authorization

2. Confidentiality Request: 0.457 And 0.459

3. Part 90.203(e) & (g) Attestation

4. Identification Drawings, 2.1033(c)(11)
   - Label
   - Location of Label
   - Compliance Statement
   - Location of Compliance Statement

5. Photographs, 2.1033(c)(12)

6. Documentation: 2.1033(c)
   - (3) User Manual
   - (9) Tune Up Info
   - (10) Schematic Diagram
   - (10) Circuit Description
   - Block Diagram
   - Parts List
   - Active Devices

By M.F.A. Inc.:

A. Testimonial & Statement of Certification

The Applicant has been cautioned as to the following:

15.21 **Information to the User**.

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

15.27(a) **Special Accessories**.

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

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

Table of Contents

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

a)	**Test Report**
b) Laboratory: (FCC: 31040/SIT) (Canada: IC 2044)	M. Flom Associates, Inc. 3356 N. San Marcos Place, Suite 107 Chandler, AZ 85225
c) Report Number:	d0560013
d) Client:	Communication Specialists, Inc. 426 W. Taft Ave Orange, CA 92665-4296
e) Identification: EUT Description:	PT-2 FCC ID: CFXPT-2 LPRS Transmitter
f) EUT Condition:	Not required unless specified in individual tests.
g) Report Date: EUT Received:	June 9, 2005 2005-May-17
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:	 Michael Findley, Laboratory Manager
n) Results:	The results presented in this report relate only to the item tested.
o) Reproduction:	This report must not be reproduced, except in full, without written permission from this laboratory.

Sub-part
2.1033(c)(14):

Test and Measurement Data

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

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

Standard Test Conditions
and
Engineering Practices

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

In accordance with ANSI C63.4-1992/2000, 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.

THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

M. FLOM ASSOCIATES, INC.
Chandler, AZ

for technical competence in the field of

Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing.

Presented this 16th day of June 2004.

President
For the Accreditation Council
Certificate Number 2152-01
Valid to August 31, 2006

A2LA

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

A2LA

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

Certificate Number: **2152-01**

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-

September 15, 1999

Mr. Morton Flom
M. Flom Associates Inc.
3356 N. San Marcos Place, Suite 107
Chandler, AZ 85224

Dear Mr. Flom:

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

As of August 1, 1999, you may submit test data to BSMI to verify that the equipment to be imported into Chinese Taipei satisfies the applicable EMC requirements. **Your assigned BSMI number is SL2-IN-E-041R; you must use this number when sending test reports to BSMI.** Your designation will remain in force as long as your NVLAP and/or A2LA and/or BSMI accreditation remains valid for the CNS 13438.

Please note that BSMI requires that the entity making application for the approval of regulated equipment must make such application in person at their Taipei office. BSMI also requires the names of the authorized signatories who are authorized to sign the test reports. You can send this information via fax to C-Taipei CAB Response Manager at 301-975-3414. **I am also enclosing a copy of the cover sheet that, according to BSMI requirements, must accompany every test report.**

NIST

If you have any questions, please contact Robert Gladhill at 301-975-4273 or Joe Dhillon at 301-975-5528. We appreciate your continued interest in our international conformity assessment activities.

Sincerely,

Belinda L. Collins, Ph.D.
Director, Office of Standards Services

Enclosure

NIST

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

BSMI Number: **SL2-IN-E-041R**

List of General Information Required for Certification

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

95G, Confidentiality

Sub-part 2.1033

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

Communication Specialists, Inc.
426 W. Taft Ave
Orange, CA 92665-4296

Manufacturer:

Communication Specialists, Inc.
426 W. Taft Ave
Orange, CA 92665-4296

(c)(2): **FCC ID**: CFXPT-2

Model Number: PT-2

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

Please see attached exhibits

(c)(4): **Type of Emission**: N0N

(c)(5): **Frequency Range, MHz**: 216.0025 to 216.9975

(c)(6): **Power Rating, Watts**: 0.080

____ Switchable ____ Variable X N/A

(c)(7): **Maximum Power Rating, Watts**: 0.100

DUT Results: Passes X Fails ____

Subpart 2.1033 (continued)

(c)(8): Voltages & currents in all elements in final RF stage, including final transistor or solid-state device:

Collector Current, A	=	per manual
Collector Voltage, Vdc	=	2.5
Supply Voltage, Vdc	=	3.6

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

Please see attached exhibits

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

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

Please see attached exhibits

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

Please see attached exhibits

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

Please see attached exhibits

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

___ Attached Exhibits
_x_ N/A

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

Follows

Name of Test: Carrier Output Power (Conducted)

Specification: 47 CFR 2.1046(a)

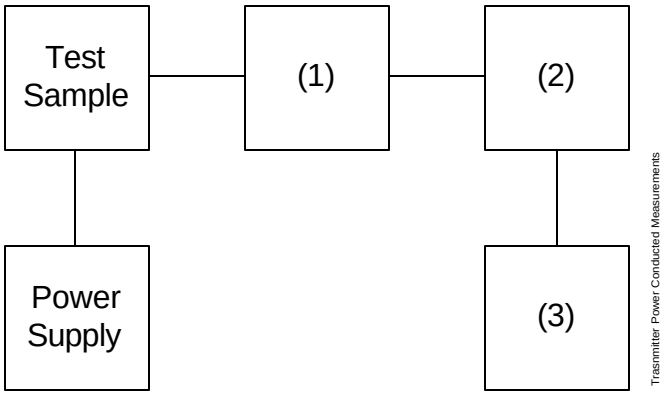
Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.1

Measurement Procedure

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

B) Measurement accuracy is ±3%.

Transmitter Test Set-Up: RF Power Output



	Asset	Description	s/n	Cycle	Last Cal
(1)	**Coaxial Attenuator**				
X	i00231/2	PASTERNACK PE7021-30 (30 dB)	231 or 232	NCR	
	i00122/3	NARDA 766 (10 dB)	7802 or 7802A	NCR	
(2)	**Power Meters**				
X	i00020	HP 8901A Power Mode	2105A01087	12 mo.	May-05
(3)	**Frequency Counter**				
X	i00020	HP 8901A Frequency Mode	2105A01087	12 mo.	May-05

Name of Test: Carrier Output Power (Conducted)

Measurement Results
(Worst case)

Frequency of Carrier, MHz	=	216.002500, 216.997500
Ambient Temperature	=	23°C ± 3°C

Power Setting	RF Power, dBm	RF Power, Watts
High	18.83	0.076

Performed By: David E. Lee, Test Engineer

Name of Test: ERP Carrier Power (Radiated)

Specification: 47 CFR 2.1046(a)

Test Equipment

	Asset	Description	s/n	Cycle	Last Cal
Transducer					
	i00088	EMCO 3109-B 25MHz-300MHz	2336	24 mo.	Sep-03
X	i00089	Aprel 2001 200MHz-1GHz	001500	24 mo.	Sep-03
X	i00103	EMCO 3115 1GHz-18GHz	9208-3925	24 mo.	Jan-04
Amplifier					
X	i00028	HP 8449A	2749A00121	12 mo.	May-05
Spectrum Analyzer					
X	i00029	HP 8563E	3213A00104	12 mo.	May-05
X	i00033	HP 85462A	3625A00357	12 mo.	Jul-04

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

g0550003: 2005-May-20 Fri 13:56:00
State: 2:High Power Ambient Temperature: 30°C ± 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV/m	CF, dB	Calc, dBuV/m	ERP, Watts
216.002500	216.003500	97.1	28.8	126.0	0.080

g0550006: 2005-May-20 Fri 14:49:00
State: 2:High Power Ambient Temperature: 30°C ± 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV/m	CF, dB	Calc, dBuV/m	ERP, Watts
216.997500	216.998300	97.9	28.8	126.7	0.095

Antenna used nominally unity (0dBi) gain

Performed By: David E. Lee, Test Engineer

Name of Test: Field Strength of Spurious Radiation

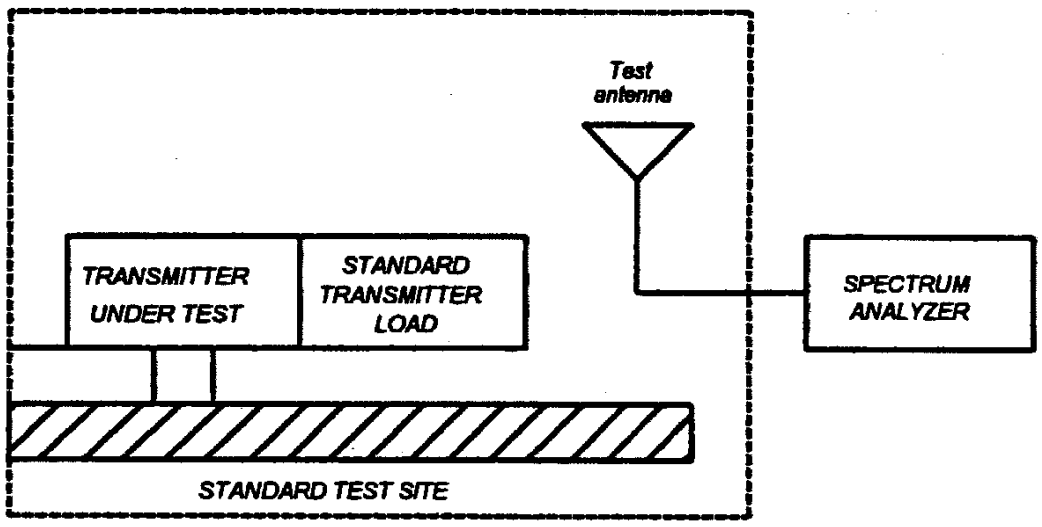
Specification: 47 CFR 2.1053(a)

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

Measurement Procedure

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.

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 = 3 times Resolution Bandwidth, or 30 kHz (22.917)
3) Sweep Speed ≤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 that is placed on the turntable. The RF cable to this load should be of minimum length.

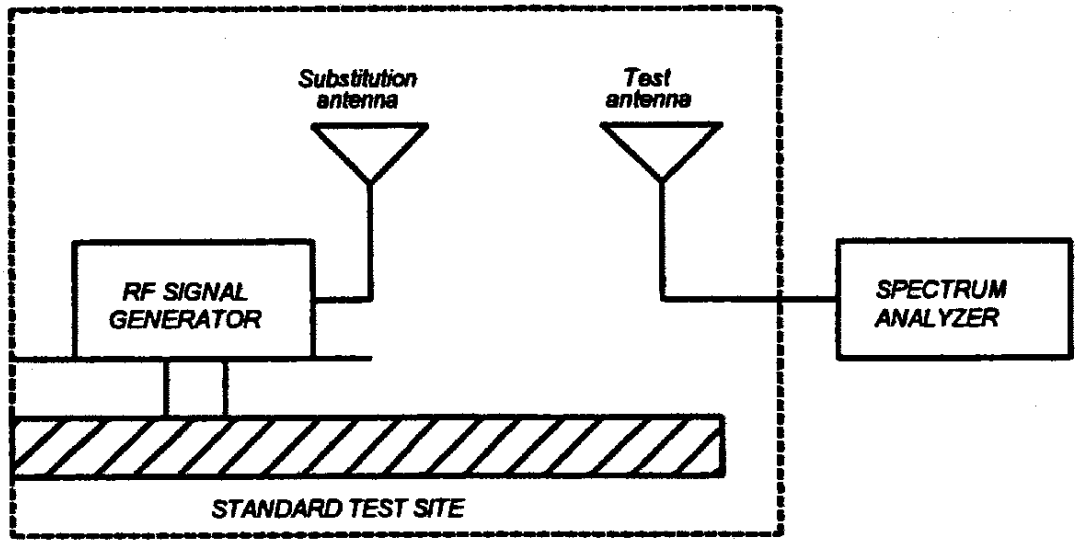


Name of Test: Field Strength of Spurious Radiation (Cont.)

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 ± 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.

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 =

$10\log_{10}$(TX power in watts/0.001) – the levels in step l)

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

Test Equipment

	Asset	Description	s/n	Cycle	Last Cal
Transducer					
	i00088	EMCO 3109-B 25MHz-300MHz	2336	24 mo.	Sep-03
X	i00089	Aprel 2001 200MHz-1GHz	001500	24 mo.	Sep-03
X	i00103	EMCO 3115 1GHz-18GHz	9208-3925	24 mo.	Jan-04
Amplifier					
X	i00028	HP 8449A	2749A00121	12 mo.	May-05
Spectrum Analyzer					
X	i00029	HP 8563E	3213A00104	12 mo.	May-05
X	i00033	HP 85462A	3625A00357	12 mo.	Sep-04
Substitution Generator					
X	i00067	HP 8920A Communication TS	3345U01242	12 mo.	Jun-04
	i00207	HP 8753D Network Analyzer	3410A08514	12 mo.	Jul-04

Microphone, Antenna Port, and Cabling

Microphone	No	Cable Length	-	Meters	
Antenna Port Terminated	Yes	Load	50 Ohm	Antenna Gain	-
All Ports Terminated by Load	N/A	Peripheral	N/A		

Name of Test: Field Strength of Spurious Radiation

Measurement Results

g0550004: 2005-May-20 Fri 14:00:00
STATE: 2:High Power Ambient Temperature: 23°C ± 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	ERP, dBm	ERP, dBc
216.002500	432.025000	-38.8	
216.002500	648.037500	-60.5	
216.002500	864.050000	-51.2	
216.002500	1080.033800	-52.8	
216.002500	1296.046300	-51.5	≥ -57.8
216.002500	1512.058800	-48.9	
216.002500	1728.033800	-48.2	
216.002500	1944.046300	-50.2	
216.002500	2160.058800	-49.6	

g0550005: 2005-May-20 Fri 14:28:00
STATE: 2:High Power Ambient Temperature: 23°C ± 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	ERP, dBm	ERP, dBc
216.997500	434.018800	-56.7	
216.997500	651.011300	-46.0	
216.997500	867.971300	-51.4	
216.997500	1084.983800	-56.3	
216.997500	1301.996300	-49.1	≥ -63.6
216.997500	1519.003800	-46.5	
216.997500	1735.977500	-44.6	
216.997500	1952.991300	-46.2	
216.997500	2170.003800	-45.0	

Performed By: David E. Lee, Test Engineer

Name of Test: Emission Masks (Occupied Bandwidth)

Specification: 47 CFR 2.1049(c)(1)

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

Measurement Procedure

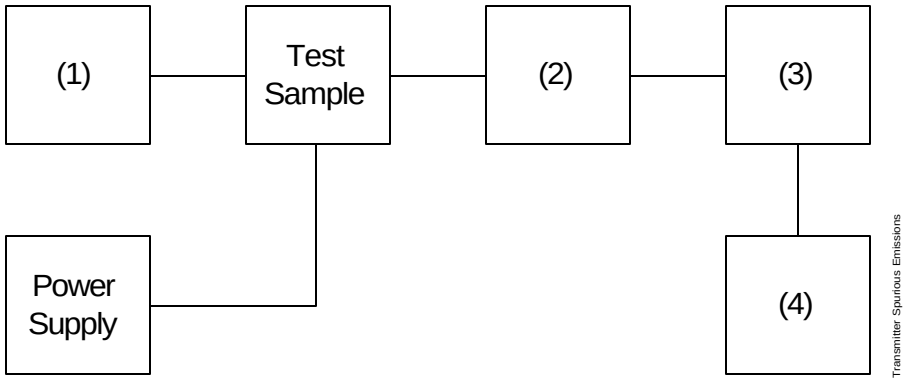
A) The EUT and test equipment were set up as shown below

B) For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for ±2.5/±1.25 kHz deviation (or 50% modulation). With level constant, the signal level was increased 16 dB.

C) For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.

D) The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

Transmitter Test Set-Up: Occupied Bandwidth



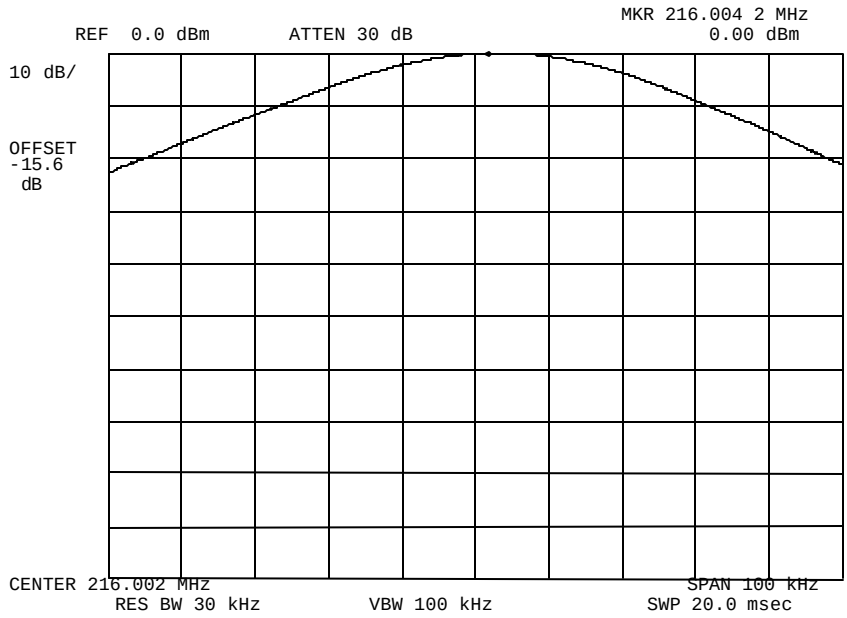
	Asset	Description	s/n	Cycle	Last Cal
(1) **Audio Oscillator/Generator**					
X	i00017	HP 8903A Modulation Meter	2216A01753	12 mo.	Apr-05
(2) **Coaxial Attenuator**					
X	i00231/2	PASTERNACK PE7021-30 (30 dB)	231 or 232	NCR	
	i00123	NARDA 766 (10 dB)	7802A	NCR	
(3) **Interface**					
X	i00021	HP 8954A Transceiver Interface	2146A00159	NCR	
(4) **Spectrum Analyzer**					
X	i00048	HP 8566B Spectrum Analyzer	2511A01467	12 mo.	Oct-04
	i00029	HP 8563E Spectrum Analyzer	3213A00104	12 mo.	May-05

Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0560100: 2005-Jun-09 Thu 17:39:00
State: 2:High Power

Ambient Temperature: 23°C ± 3°C



Power: HIGH (Reference Level)
Modulation: NONE

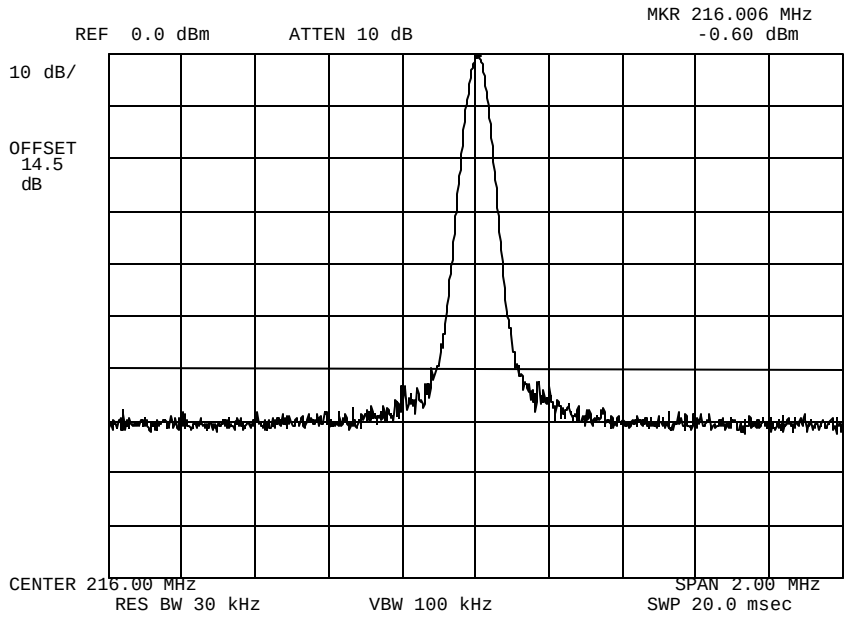
Performed By: David E. Lee, Test Engineer

Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0550002: 2005-May-17 Tue 13:27:00
State: 2:High Power

Ambient Temperature: 23°C ± 3°C



Power: HIGH
Modulation: NONE

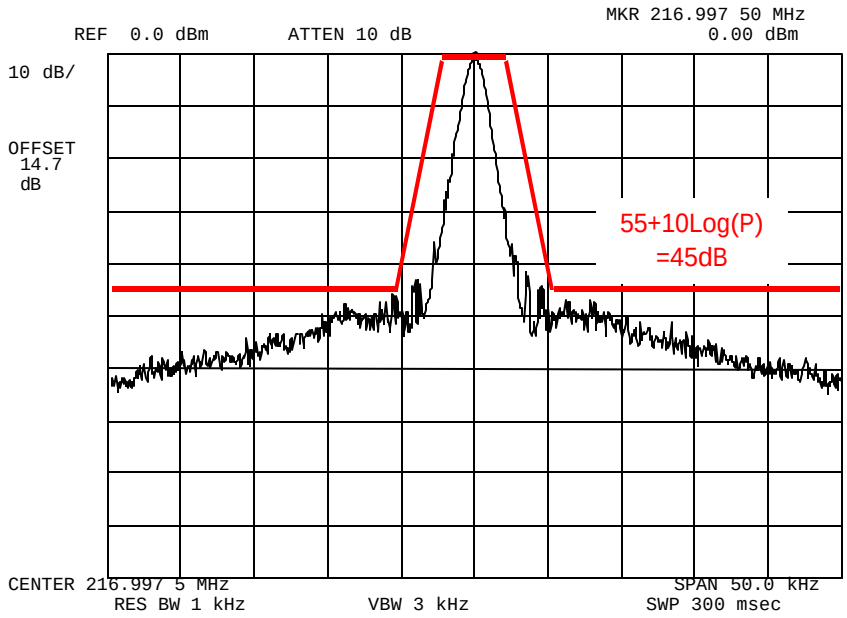
Performed By: David E. Lee, Test Engineer

Name of Test: Emission Masks (Occupied Bandwidth)

Measurement Results

g0560099: 2005-Jun-03 Fri 09:55:00
State: 2:High Power

Ambient Temperature: 23°C ± 3°C



Power: HIGH (80mW = 19dBm)
Modulation: NONE
Mask Per 47CFR95.635(c)(3)

Performed By: David E. Lee, Test Engineer

Name of Test: Frequency Stability (Temperature Variation)

Specification: 47 CFR 2.1055(a)(1)

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

Measurement Procedure

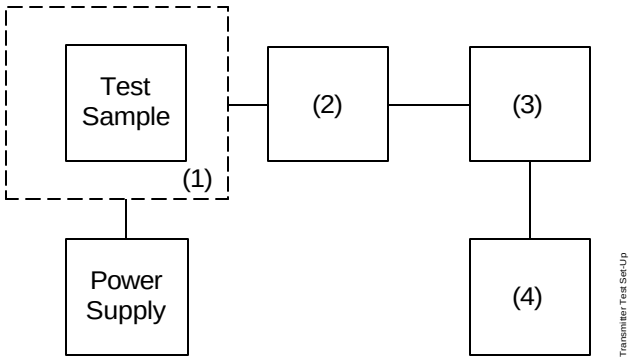
A) The EUT and test equipment were set up as shown on the following page.

B) With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.

C) With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

D) The temperature tests were performed for the worst case.

Transmitter Test Set-Up: Temperature Variation

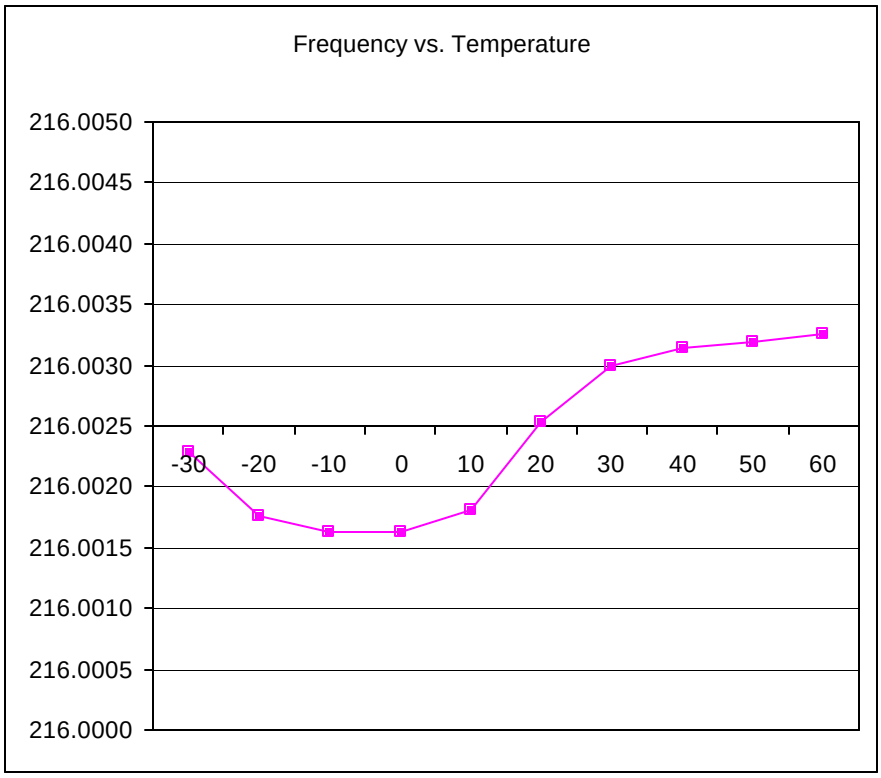


	Asset	Description	s/n	Cycle	Last Cal
(1) **Temperature, Humidity, Vibration**					
X	i00027	Tenney Temp. Chamber	9083-765-234	NCR	
(2) **Coaxial Attenuator**					
X	i00231/2	PASTERNACK PE7021-30 (30 dB)	231 or 232	NCR	
	i00122/3	NARDA 766 (10 dB)	7802 or 7802A	NCR	
(3) **RF Power**					
X	i00067	HP 8920A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

Name of Test: Frequency Stability (Temperature Variation)

Measurement Results

State: Room Temperature: 23°C ± 3°C



Performed By: David E. Lee, Test Engineer

Name of Test: Frequency Stability (Voltage Variation)

Specification: 47 CFR 2.1055(d)(1)

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

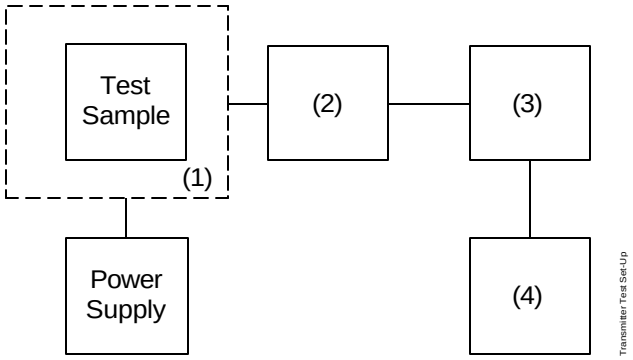
Measurement Procedure

A) The EUT was placed in a temperature chamber (if required) at 25±5°C and connected as shown below.

B) The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.

C) The variation in frequency was measured for the worst case.

Transmitter Test Set-Up: Voltage Variation



	Asset	Description	s/n	Cycle	Last Cal
(1) **Temperature, Humidity, Vibration**					
X	i00027	Tenney Temp. Chamber	9083-765-234	NCR	
(2) **Coaxial Attenuator**					
X	i00231/2	PASTERNACK PE7021-30 (30 dB)	231 or 232	NCR	
	i00122/3	NARDA 766 (10 dB)	7802 or 7802A	NCR	
(3) **RF Power**					
X	i00020	HP 8901A Power Mode	2105A01087	12 mo.	May-05
(4) **Frequency Counter**					
X	i00020	HP 8901A Frequency Mode	2105A01087	12 mo.	May-05

Results: Frequency Stability (Voltage Variation)

State: Ambient Temperature: 23°C ± 3°C

Limit, ppm	=	1.5
Limit, Hz	=	324
Battery End Point (Voltage)	=	2.50

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
100	3.60	216.002390	-110	-0.51
85	3.06	216.002330	-170	-0.79
BEP	2.50	216.002320	-180	-0.83

Performed By: David E. Lee, Test Engineer

Name of Test: Necessary Bandwidth and Emission Bandwidth

Specification: 47 CFR 2.202(g)

Modulation = None N0N

Necessary Bandwidth Calculation:

Maximum Modulation (M), kHz		0
Maximum Deviation (D), kHz	=	0
Constant Factor (K)	=	1
Necessary Bandwidth (B_N), kHz	=	0
	=	

Performed By: David E. Lee, Test Engineer

END OF TEST REPORT

Testimonial
and
Statement of Certification

This is to Certify:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.

2. **That** the technical data supplied with the application was taken under my direction and supervision.

3. **That** the data was obtained on representative units, randomly selected.

4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

Certifying Engineer: David E. Lee, Quality Manager

M. Flom Associates, Inc.
3356 North San Marcos Place, Suite 107
Chandler, Arizona 85225-7176
(480) 926-3100 phone, fax (480) 926-3598

Subpart 2.1033 (continued)
(c)(8): Voltages & currents in all elements in final RF stage, including final transistor or solid-state device:

Collector Current, A	=	0.03 max (measured)
Collector Voltage, Vdc	=	2.5
Supply Voltage, Vdc	=	3.6

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

Please see attached exhibits

(c)(10): **Circuit Diagram/Circuit Description**:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please see attached exhibits

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

Please see attached exhibits

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

Please see attached exhibits

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

___ Attached Exhibits
_x_ N/A

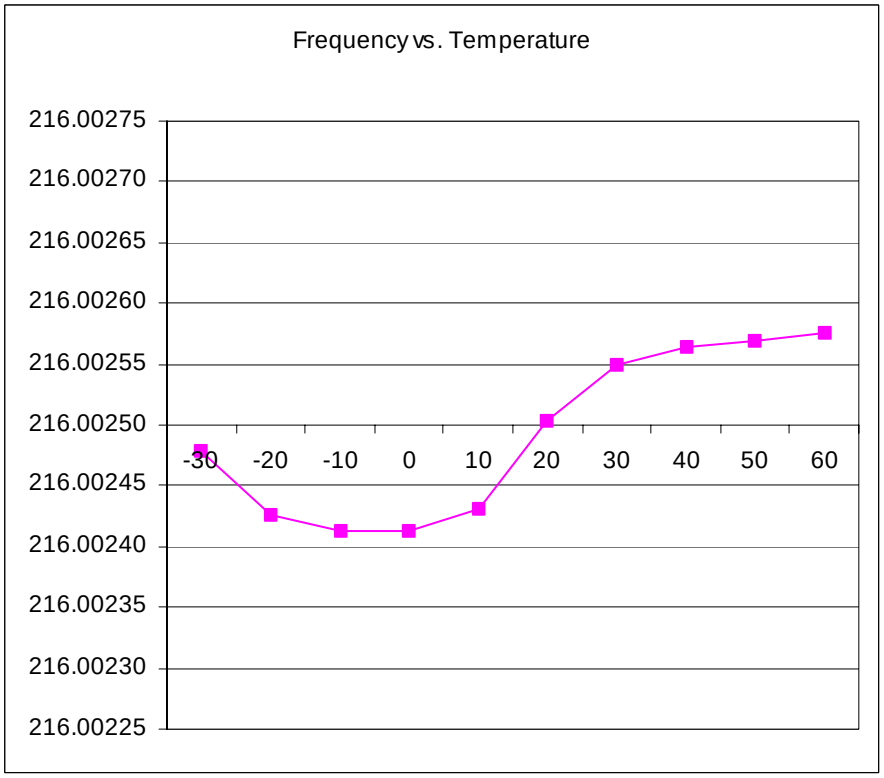
(c)(14): **Test and Measurement Data**:

Follows

Name of Test: Frequency Stability (Temperature Variation)

Measurement Results

State: Room Temperature: 23°C ± 3°C

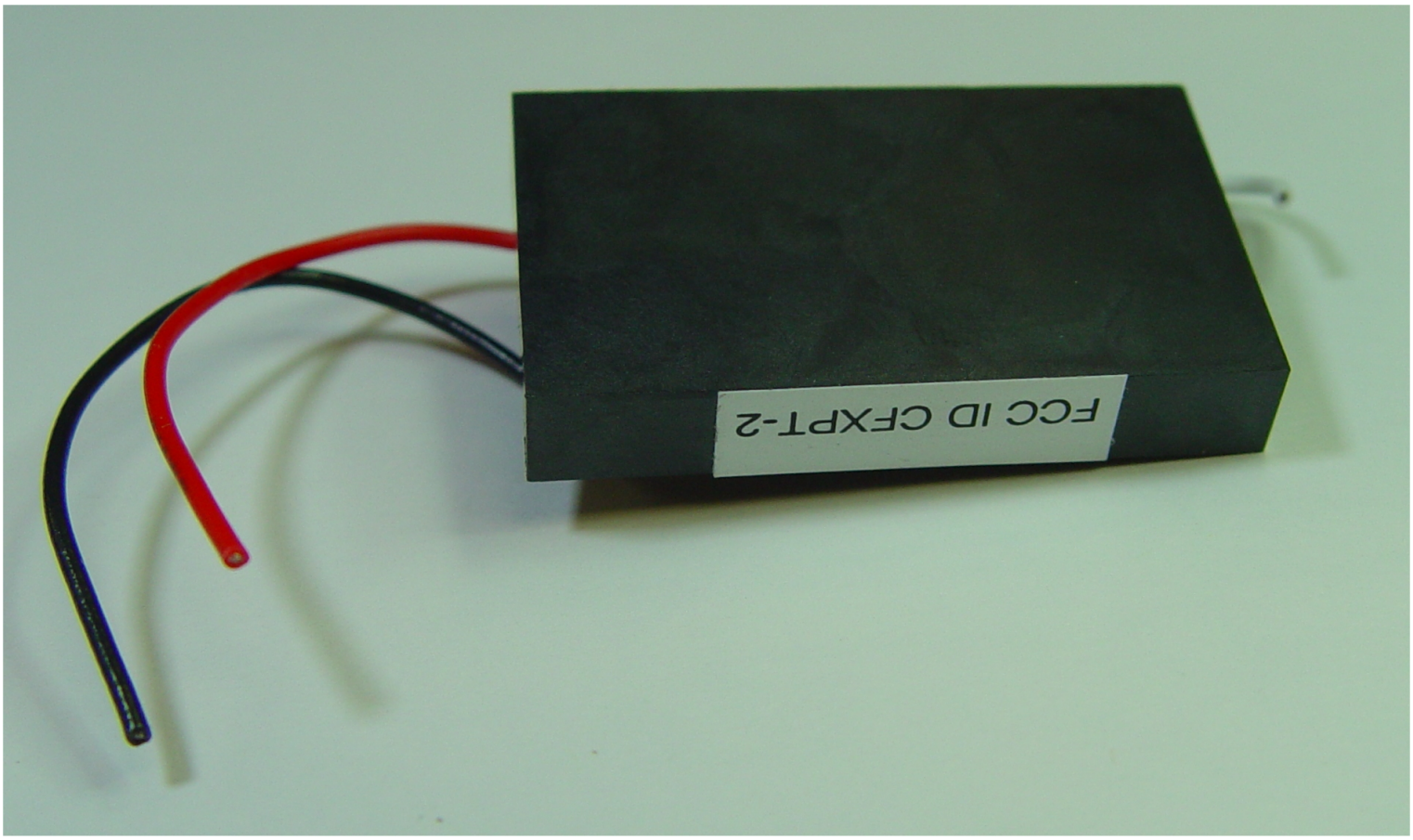


Performed By: David E. Lee, Test Engineer

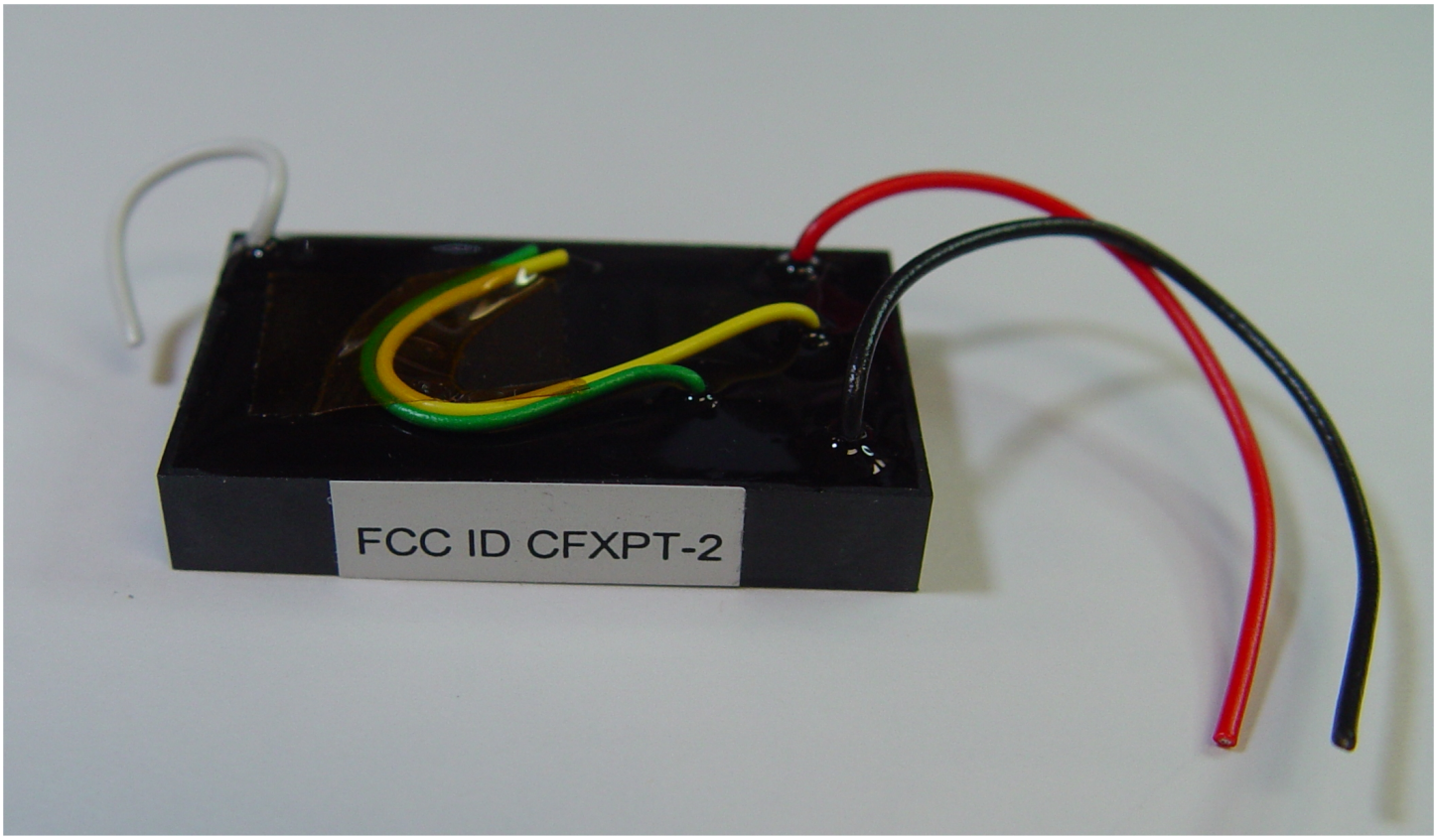
List of Active device and symbol and its functions.

Designator	Footprint		Function
Q-01	CEL-M13-Mark-1		Oscillator
Q-02	CEL-M13-Mark-1		buffer amplifier
Q-03	CEL-M13-Mark-1		pre-amplifier
Q-04	CEL-19 - W MARK		driver amplifier
Q-05	CEL-M04-NE664M04		final amplifier
U-01	NS-TLA05-LP3987-3		voltage regulator
U-02	MLP-11-B-8051F30X-1		CPU
U-03	SSOP-5-P-0.65-TC7SC04FU		interver
U-04	NS-LMX2470-1		PLL synthesyzer
U-05	NS-TLA05-LP3987-3		voltage regulator
XTAL-01	TEW-TTS18-SML-PAD		crystal oscillator

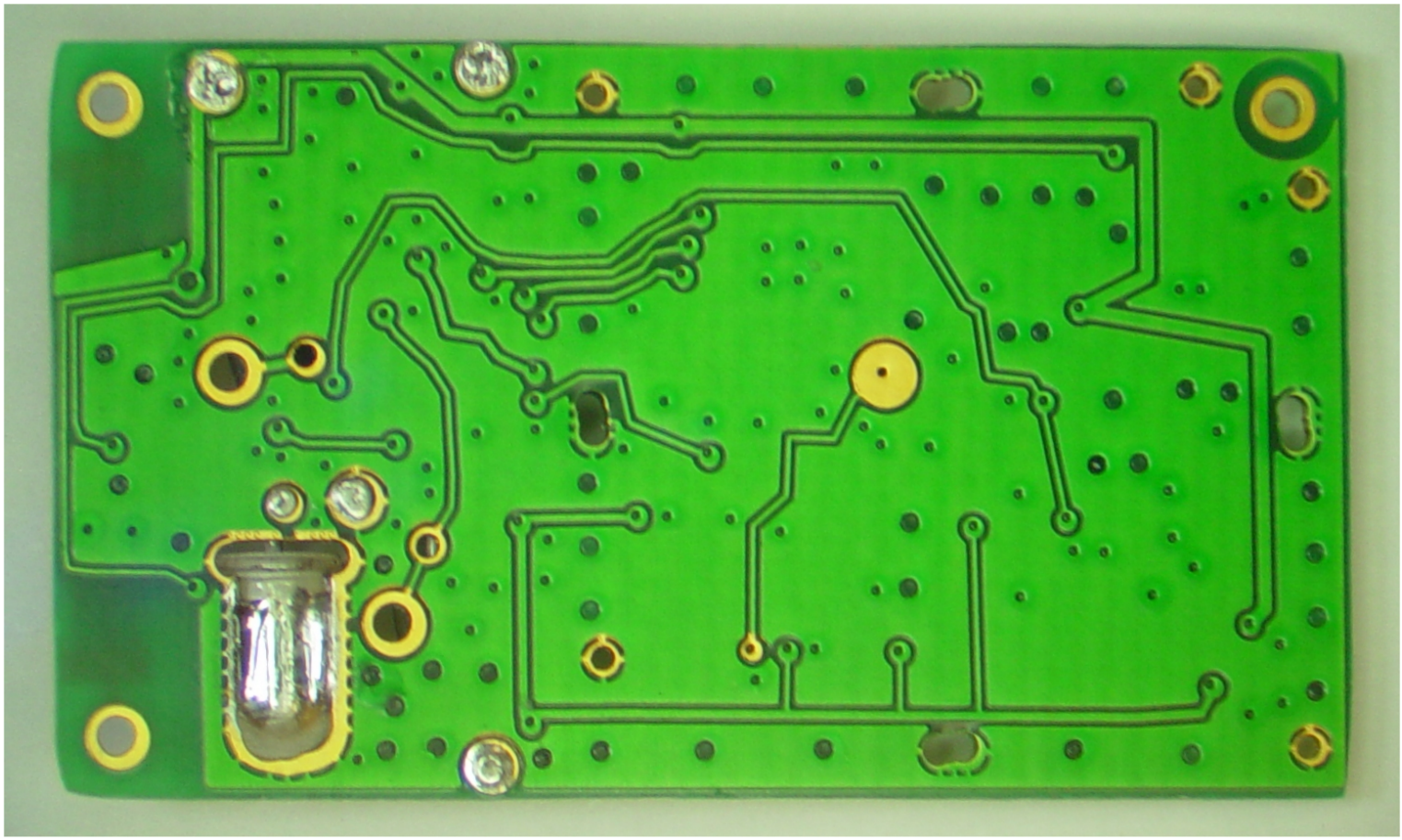
External bottom photo



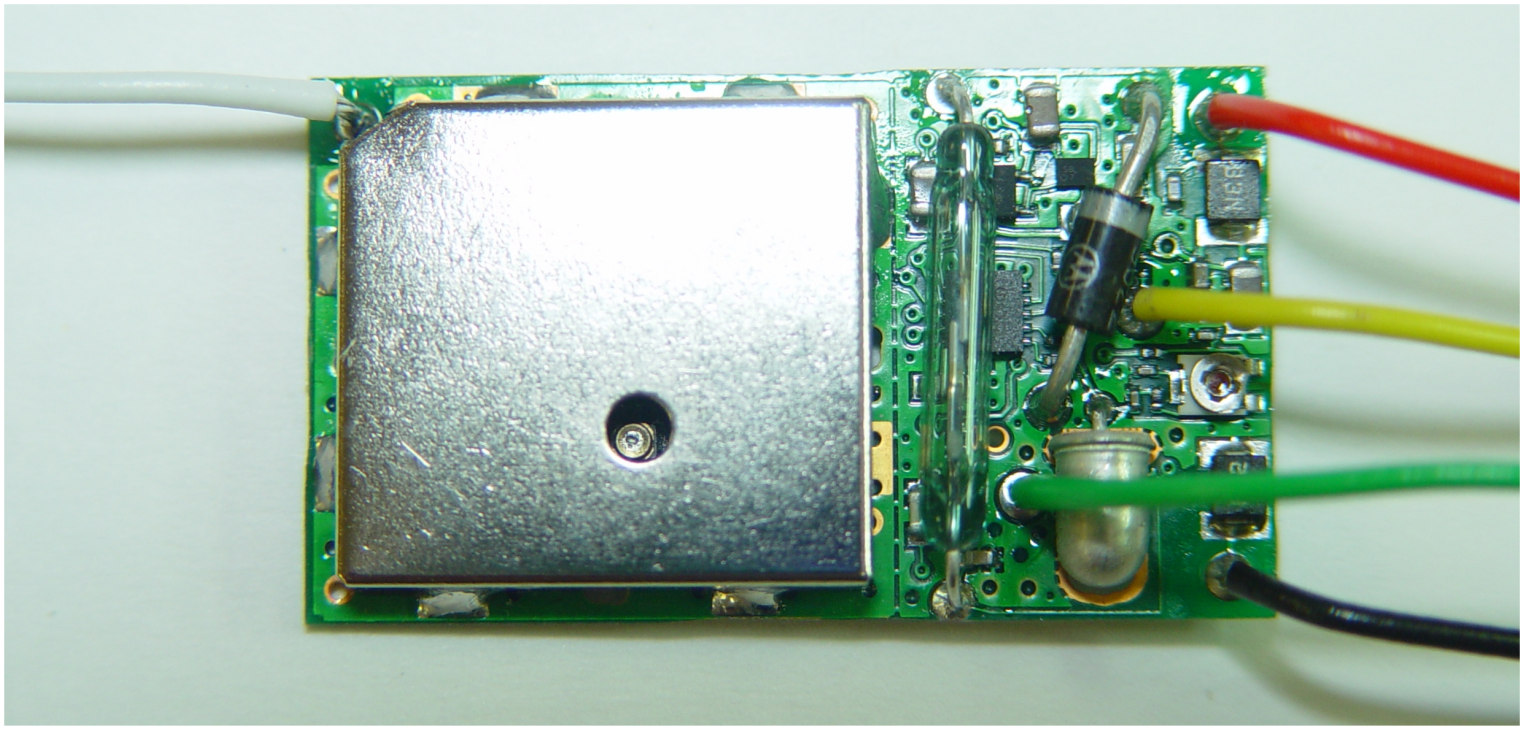
External topside photo

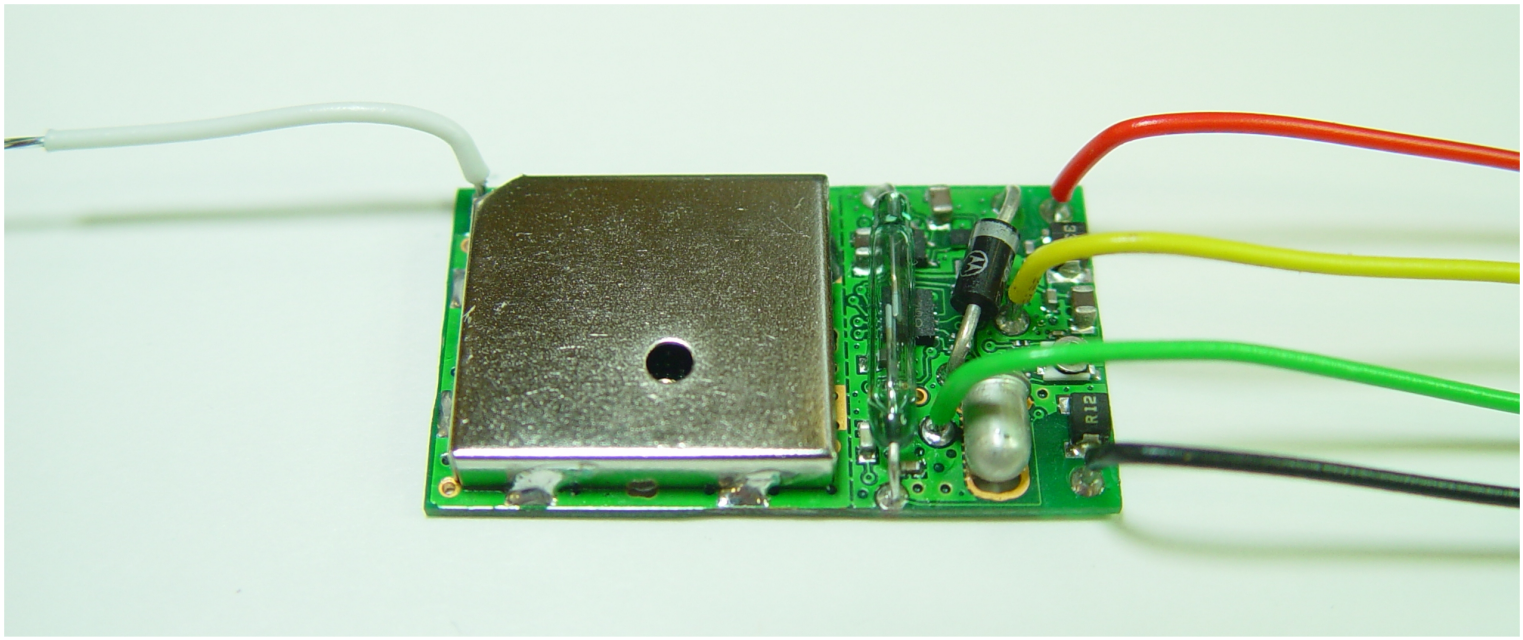


Printed Circuit Board bottom photo



Printed Circuit Board Front photo with shield





Printed Circuit Board Front photo without shield