ALINCO®
U.S.A. ALINCO BRANCH

438 Amapola Ave., Suite 130 • Torrance, California 90501
Phone: 310/618-8616 Fax: 310/618-8758

( Translation )

Report XE642T : by Shigeki Kajimoto, Chief engineer XE642、Alinco,Inc. Osaka, Japan

1: About Plot Graph

The graph shows jamming margin value of the device. It was measured under condition shown below:

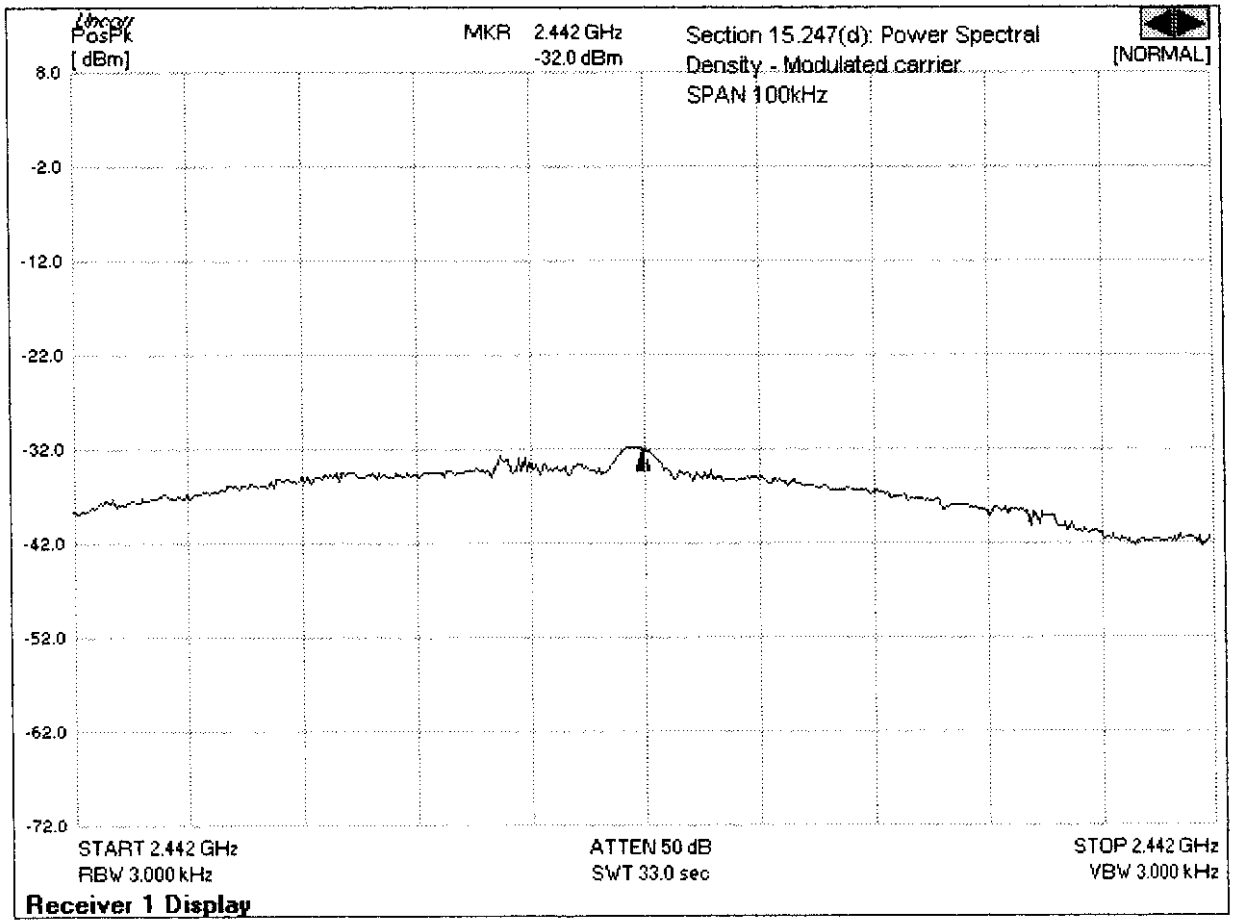
(1) Spectrum Spreading signal generated
(2) Transmitting data
(3) Received data

The transmitting spectrum spread gain plot is measured under condition shown below:

(1) spreading ON/OFF switching
(2) spectrum analyzer

2. Is the graph showing output of XE642T?
YES, both jamming margin plot and spreading gain plot are measured with actual XE642T.

3.Is XE642 supplied with ON/OFF switching of S-S signal?
YES, this is to measure frequency accuracy for production and maintenance of the device. If it is in OFF position, the device can not modulate the data so it makes impossible to communicate.


PosPk
[dBm]
MKR 2.442 GHz
-32.0 dBm
Section 15.247(d): Power Spectral Density - Modulated carrier
SPAN 100kHz
[NORMAL]
8.0
-2.0
-12.0
-22.0
-32.0
-42.0
-52.0
-62.0
-72.0
START 2.442 GHz
RBW 3.000 kHz
ATTEN 50 dB
SWT 33.0 sec
STOP 2.442 GHz
VBW 3.000 kHz
Receiver 1 Display

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To turn off the SS following circuit is set: the interface connector's TEST terminal is used at open position normally, but L is input, by EX-OR IC17:TC7S86F transmission request signal TXRQ's logic is modified and stops internal transmission system clock at SS base-band processor IC24: BU8951KS, thus SS signal is stopped. Also by NOT IC20:TC7S04F and Q2:UN5211, IF alternate-direct demodulator IC13:HFA3724's balanced modulator's DC balance are made unbalanced, thus S-spreading stops and transmits carrier signal only.

4. TX/RX operation and circuit

As mentioned on 3, SS off function is for production/maintenance purpose only and the communication can not be obtained with off position.

Normal data transmission is obtained by L on interface terminal CN2:TXRQ(8pin). TXRQ Signal is input to CPU:IC9 PIC16C63(21pin), after PLL lock is confirmed, turn 14pin to H. IC9's 14pin is connected to D-FF:IC10B's reset 13pin. It resets by becoming H and transmission data-clock is input to D-FF, it switches TX/RX control voltage thus it goes to transmission mode. For receiving, CPU controls D-FF:IC10B's reset 13pin to L.

I, Katsumi Nakata, Branch manager of USA Alinco Branch hereby declared that above is a translation of attached report made by Mr.Kajimoto, with my best of knowledge of the language and electronics.

7/24/98

**Alinco**
**Conducted Test: 7/30/98 6:11:34 PM**
**Work order: 980206**
**Model: XE642T Data Transceiver**
**Mode: 5VDC**
**FCCID: EUGXE642T**
**Limit: FCCB**
**Name: Dan Baltzell**

**NEUTRAL SIDE (Line 1)**

| EMISSION FREQUENCY (MHz) | TEST DETECTOR | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | FCC QP(1) LIMIT (dBuV) | FCC QP(1) MARGIN (dBuV) | FCC AV(1) LIMIT (dBuV) | FCC AV(1) MARGIN (dBuV) |
|---|---|---|---|---|---|---|---|---|
| 0.467 | Pk | 41 | 0.3 | 41.3 | 48 | -6.7 | 48 | -6.7 |
| 0.501 | Pk | 41.1 | 0.3 | 41.4 | 48 | -6.6 | 48 | -6.6 |
| 0.6 | Pk | 39.1 | 0.3 | 39.4 | 48 | -8.6 | 48 | -8.6 |
| 0.7 | Pk | 34.8 | 0.3 | 35.1 | 48 | -12.9 | 48 | -12.9 |
| 6.433 | Pk | 28.9 | 1.8 | 30.7 | 48 | -17.3 | 48 | -17.3 |
| 20.001 | Pk | 35.9 | 3.1 | 39 | 48 | -9 | 48 | -9 |
| 21.29 | Pk | 35.6 | 3.2 | 38.8 | 48 | -9.2 | 48 | -9.2 |

**HOT SIDE (Line 2)**

| EMISSION FREQUENCY (MHz) | TEST DETECTOR | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | FCC QP(1) LIMIT (dBuV) | FCC QP(1) MARGIN (dBuV) | FCC AV(1) LIMIT (dBuV) | FCC AV(1) MARGIN (dBuV) |
|---|---|---|---|---|---|---|---|---|
| 0.45 | Pk | 37.6 | 0.3 | 37.9 | 48 | -10.1 | 48 | -10.1 |
| 0.501 | Pk | 33 | 0.3 | 33.3 | 48 | -14.7 | 48 | -14.7 |
| 0.6 | Pk | 28.8 | 0.3 | 29.1 | 48 | -18.9 | 48 | -18.9 |
| 0.7 | Pk | 27.8 | 0.4 | 28.2 | 48 | -19.8 | 48 | -19.8 |
| 6.49 | Pk | 28.1 | 2 | 30.1 | 48 | -17.9 | 48 | -17.9 |
| 20 | Pk | 36 | 3.3 | 39.3 | 48 | -8.7 | 48 | -8.7 |
| 21.331 | Pk | 35.1 | 3.4 | 38.5 | 48 | -9.5 | 48 | -9.5 |

**FINAL DATA**

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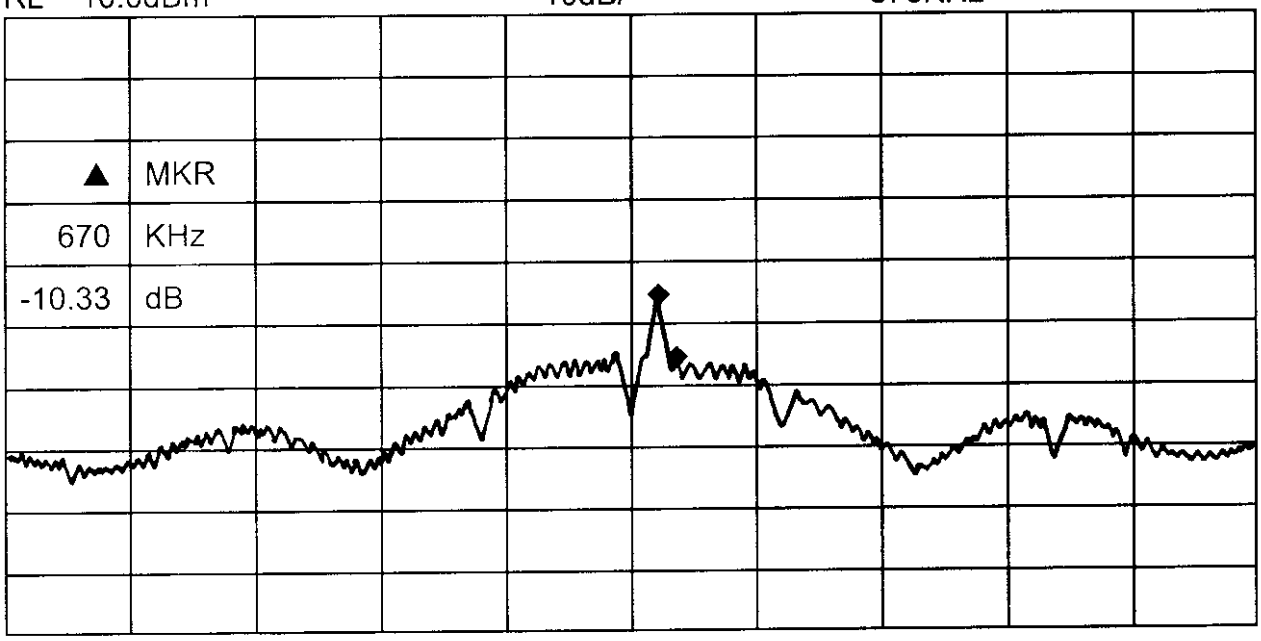
EUG5U5XE-642T ALINCO SB/040998

ATTEN 20dB
RL 10.0dBm

10dB/

▲MKR -10.33dB
670KHz




CENTER 2.44200GHz
✪RBW 300KHz VBW 300KHz

SPAN 50.00MHz
SWP 50.0ms

4/9/98

## SPECIFICATIONS FOR THE SLEEVE ANTENNA

1. Type: Sleeve antenna for the ISM band radio communication unit
2. Frequency Range: Model number: ALINCO2400DP002
3. Electrical Specifications:
   a. VSWR: 2.0 : 1
   b. Impedance: 50 ohms
   c. Gain: 2.0dBi maximum. (cable not included)
4. Dimensions:
   a. Connector: Hirose FL-LP-DFS111 plug
   b. Length: 150 mm
   c. Diameter: 12 mm at the bottom
   d. Color: dark gray
   e. Intensity: When a 2 Kg of load is applied between the antenna and the cable, it should not be broken for longer than 5 seconds.

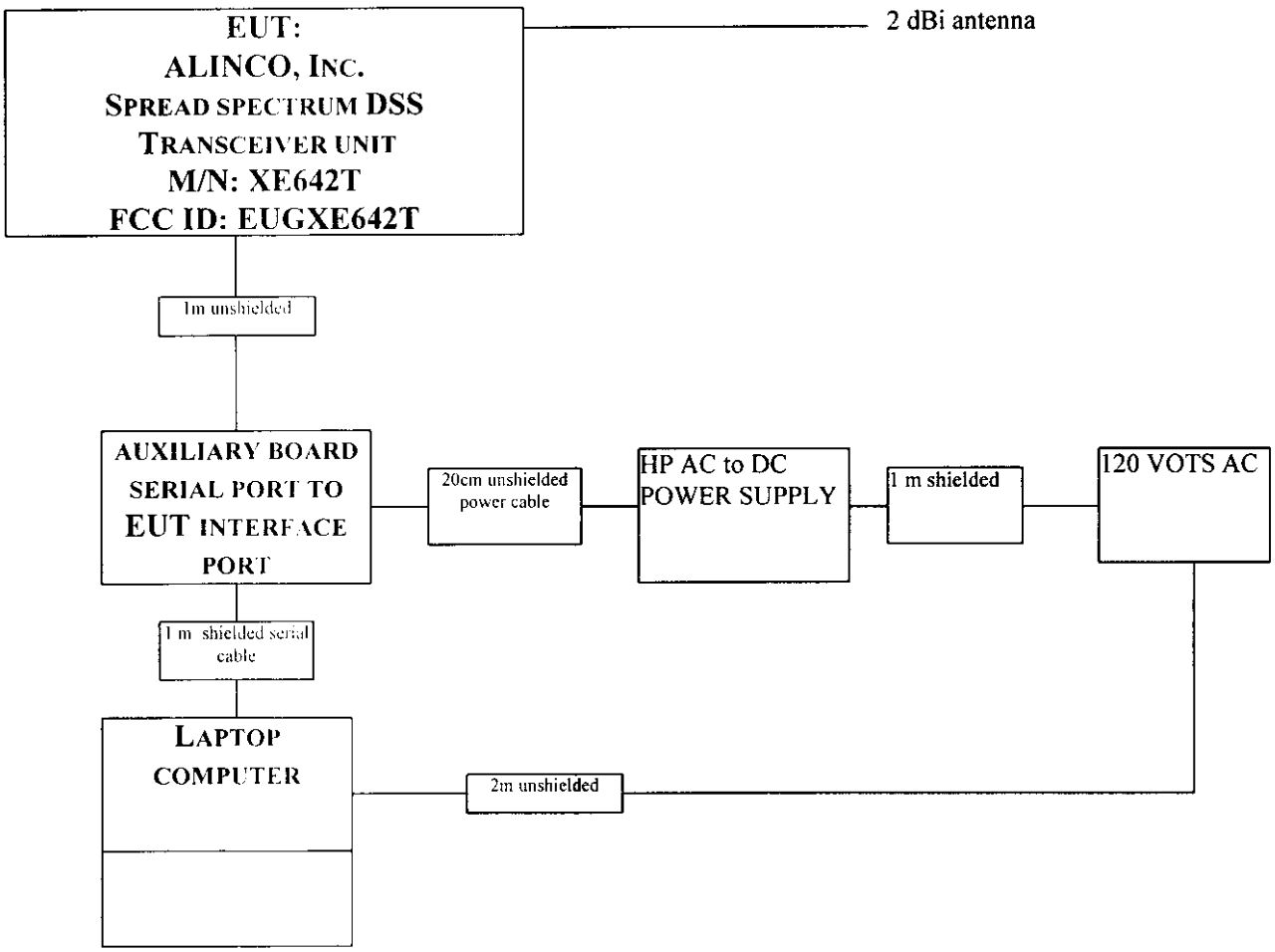
## 1.2 RELATED SUBMITTAL(S)/GRANT(S)

N/A. This is an original submission for Certification. **1.3TEST SYSTEM DETAILS**

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards. which have grants) are:

| DESCRIPTION | MANUFACTURER | MODEL | SERIAL NO | FCC ID | CABLE DESCRIPTIONS |
|---|---|---|---|---|---|
| **TRANSCEIVER UNIT (EUT)** | **ALINCO, INC.** | **XE642** | **T000102** | **EUGXE642T** | **UNSHIELDED POWER** |
| AUXILIARY INTERFACE BOARD | ALINCO. INC. | DSSNET 9611 | 2019597 | N/A | SHIELDED I/O, UNSHIELDED POWER |
| ANTENNA | ALINCO. INC. | ALINCO2400DP002 | N/A | N/A | SHIELDED COAX |
| LAPTOP | SHARP | PC-3010 | 5C138995 | EUNCA0014 | SHIELDED POWER |
| POWER SUPPLY | HEWLETT PACKARD | HP6291A | N/A | N/A | SHIELDED POWER |

## .4 CONFIGURATION OF TESTED SYSTEM



## 1.5 TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 3 meters. Emissions above 1 GHz were video averaged. Note: Conducted emission was not performed. The EUT is not A.C powered. Additionally, modulated band width, power output, antenna spurious noise, spectral density, and processing gain were measured per FCC Rules and Regulations. CFR 47, part 15, October 1, 1997.

## 1.6 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

# 3.0 SYSTEM TEST CONFIGURATION

## 3.1 JUSTIFICATION

To complete the test configuration required by the FCC, the transceiver was connected to an interface auxiliary board through a fifteen-pin port. The interface board was then connected to a lap top computer's serial port. Since the EUT does not have a power supply, a lab Hewlett Packard power supply was used to provide +5 volts DC for radiated emissions testing. Being DC powered, conducted emission was not performed on the EUT. The EUT was also tested in all three orthogonal planes in order to determine worst case emission. The EUT was investigated and tested from 30 MHz to 25 GHz. The following IF, local oscillators, and crystal oscillators namely 153.5 MHz 2,442.0 MHz, 2,288.5 MHz, 307 MHz, and 22 MHz and their harmonics were investigated and tested. A manufactures service port next to the audio port was not used during testing. This port is exclusively used by the manufacture to service and diagnose the EUT.

## 3.2 EUT EXERCISE SOFTWARE

The EUT was enabled to continuously transmit H characters from the serial port of a laptop computer. An interface board provided by the manufacturer enabled the serial port to EUT connection. Light emitting diodes on the EUT were check and verified that the EUT was in transmitting mode. The carrier was also checked to verify that the information was being transmitted. Worst case emissions are recorded in the data tables.

## 3.3 SPECIAL ACCESSORIES

**An auxiliary interface board provided by ALINCO, INC. was used to communicate between the laptop computer's serial port and the EUT.**

## 3.4 MODULATED BANDWIDTH

The minimum 6 dB bandwidth per FCC 15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1 MHz, and the video bandwidth set at 1 MHz. The Minimum 6 dB modulated bandwidth is 2.950 MHz. The 6 dB un-modulated bandwidth was also measured at 10.33 MHz. Both plots are attached. See 6 dB band width plots.

## 3.5 POWER OUTPUT:

The power output per FCC 15.247(b) was measured on the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 3 MHz, and the video bandwidth set at 3 MHz. The Peak power measured for modulated output power is 3.18 m-watt and the UN-modulated power is 3.18 m-watt. Both plots are attached. See power output plots attached.

## 3.6 CONDUCTED SPURIOUS EMISSION:

Spurious emission per FCC 15.247(c) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The modulated carrier was identified at 2.442GHz with peak amplitude at 94.3 dBuV. No other harmonics or spurs were found within 20 dB of the carrier level, and from 30 MHz to the carrier $10^{th}$ harmonic. See conducted spurious noise plots.

## 3.7 POWER SPECTRAL DENSITY:

The Power spectral density per FCC 15.247(c) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 3kHz, and the video bandwidth set at 3kHz. The spectral lines were resolved for the modulated carrier at 2.442GHz with an amplitude of -10dBm, well below the +8dBm limit. The UN-modulated spectral density lines was also resolved and measured at –4.2dBM. Additionally Fast Fourier transforms measurements for the modulated, and un-modulated carriers were performed. Plots are attached for all of the aforementioned measurements.

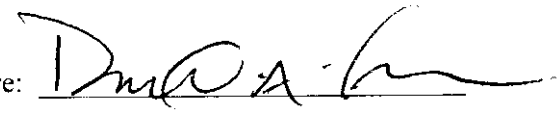
## 3.8 PROCESSING GAIN:

The Processing gain per FCC 15.247(e) was performed and measured by the manufacturer in Japan. The test result is attached in the form of a graph.

## 3.9 CONFORMANCE STATEMENT

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made during testing to the equipment in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the ANSI C63.4 test methodology.

Signature: 

Date: April 20, 1998

Typed/Printed Name: Desmond A. Fraser

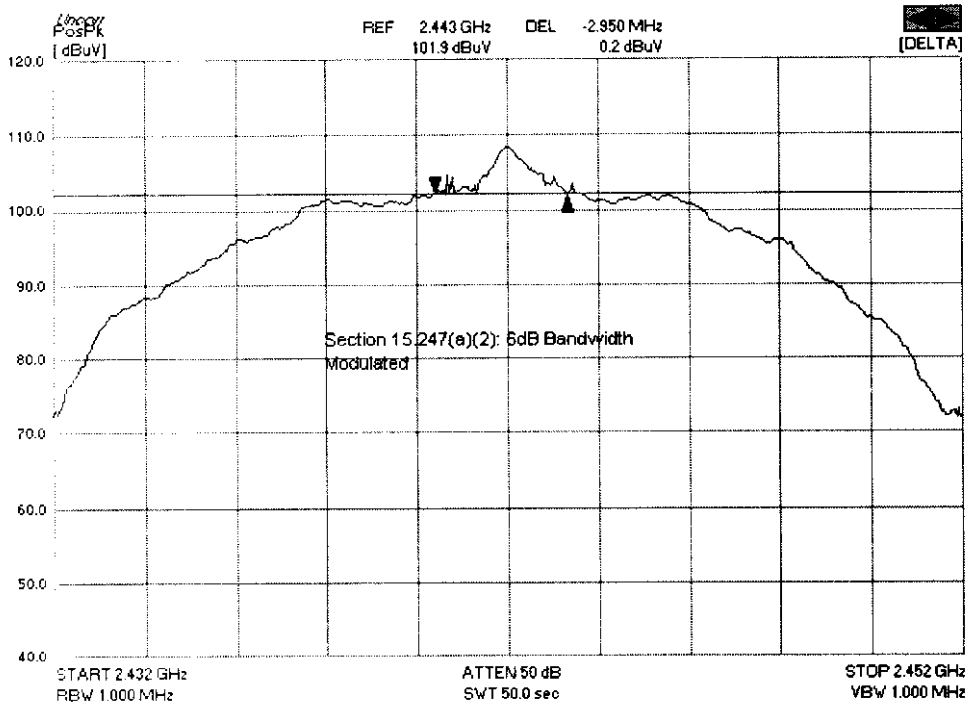
Position: Quality Manager
(NVLAP Signatory)

NVLAP *Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.*

**Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.**

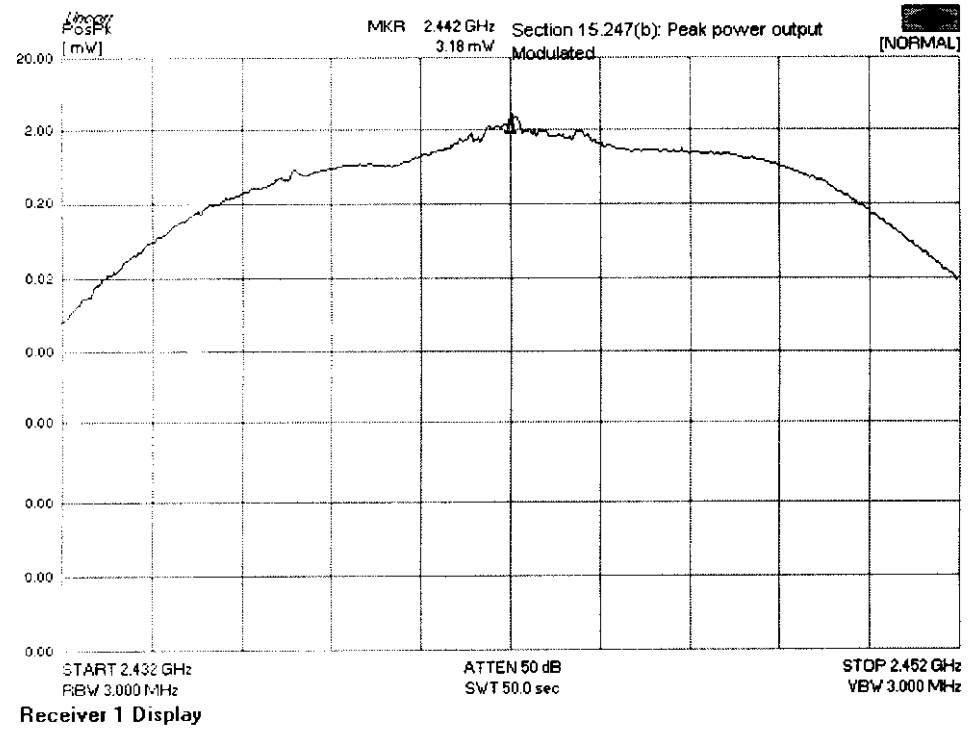
# 4.0 MEASUREMENT PLOTS

FIGURE 3: 6dB Modulated Bandwidth




**Receiver 1 Display**

FIGURE 4: Power Output Plots Peak Power Output-Modulated




**Receiver 1 Display**

FIGURE 5: Power Output Plots Peak Power Output-Un-modulated

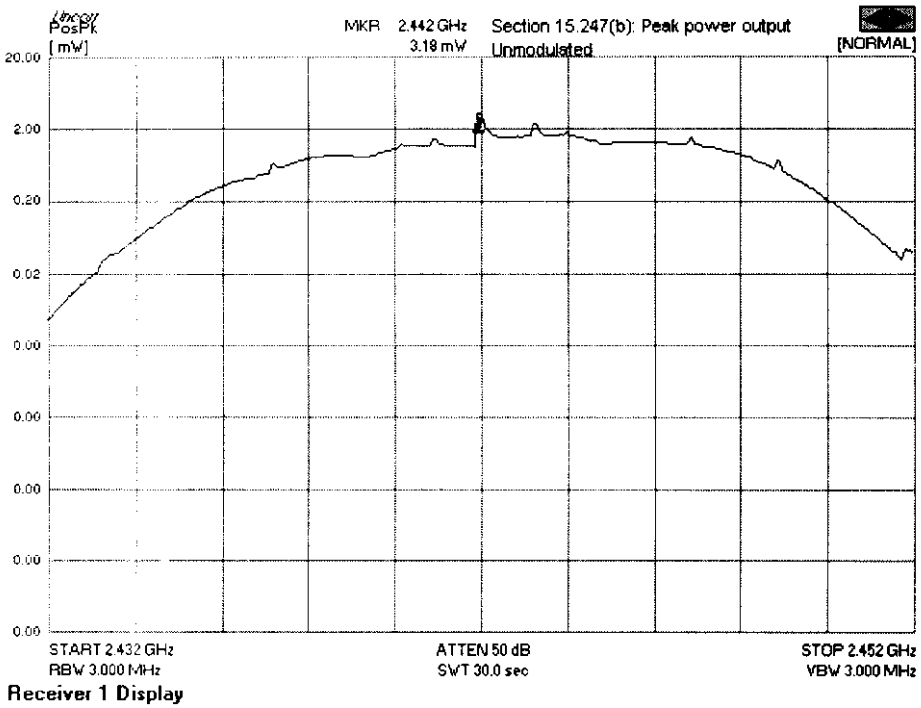



FIGURE 6: Conducted spurious emission-modulated carrier

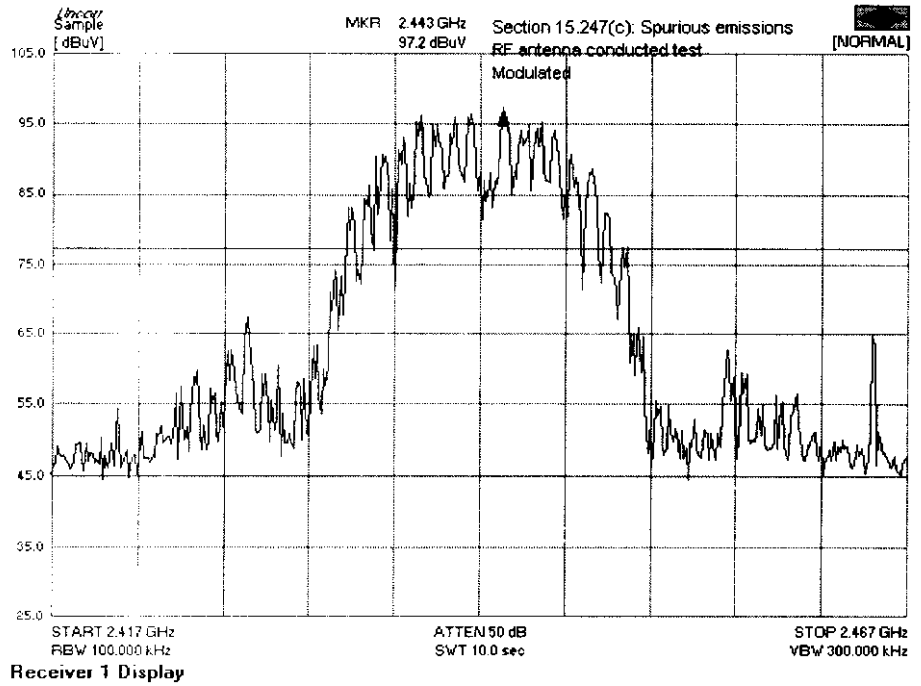


FIGURE 7: Conducted spurious emission-right modulated carrier

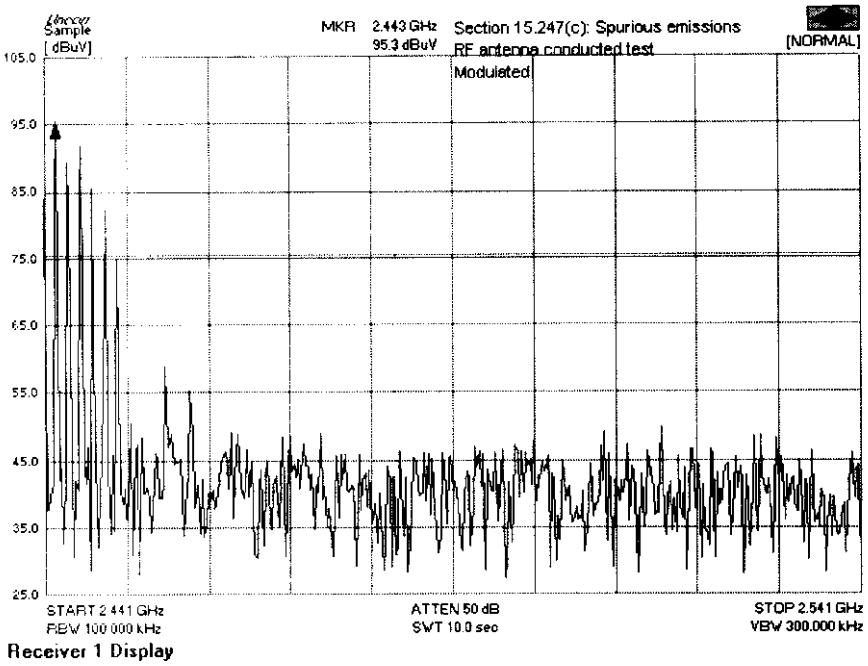



FIGURE 8: Conducted spurious emission-left modulated carrier

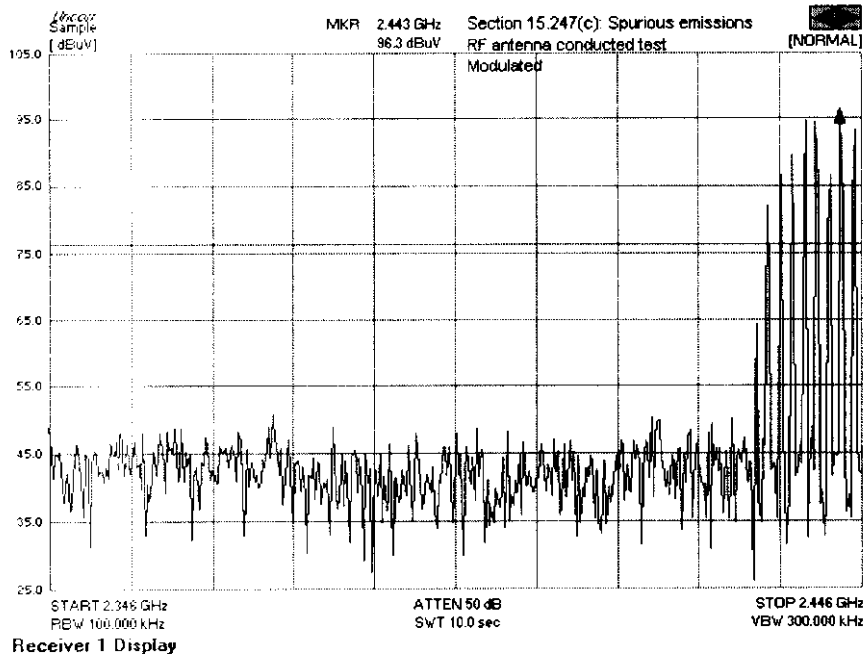


FIGURE 9: Conducted spurious emission 30 to 1GHz

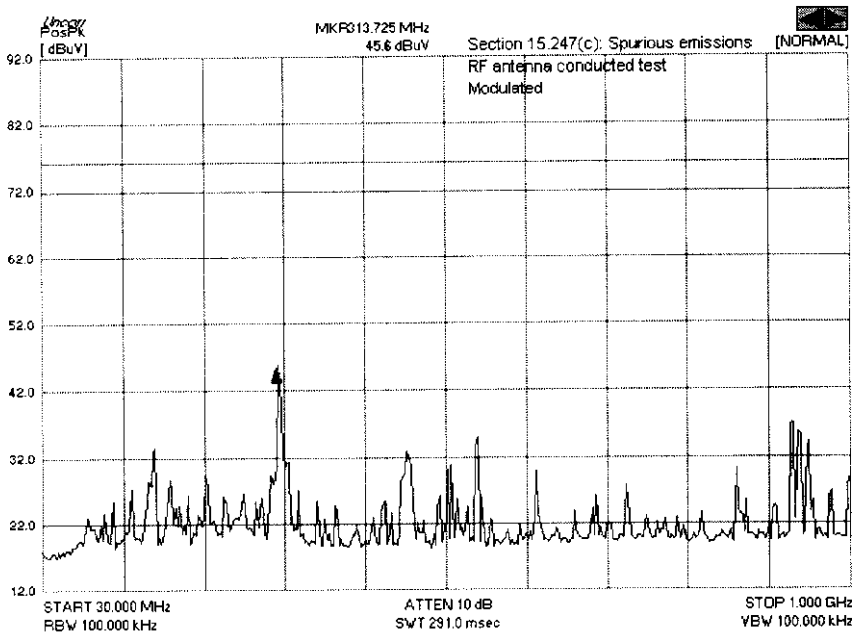



FIGURE 10: Conducted spurious emission 1 to 6.5 GHz

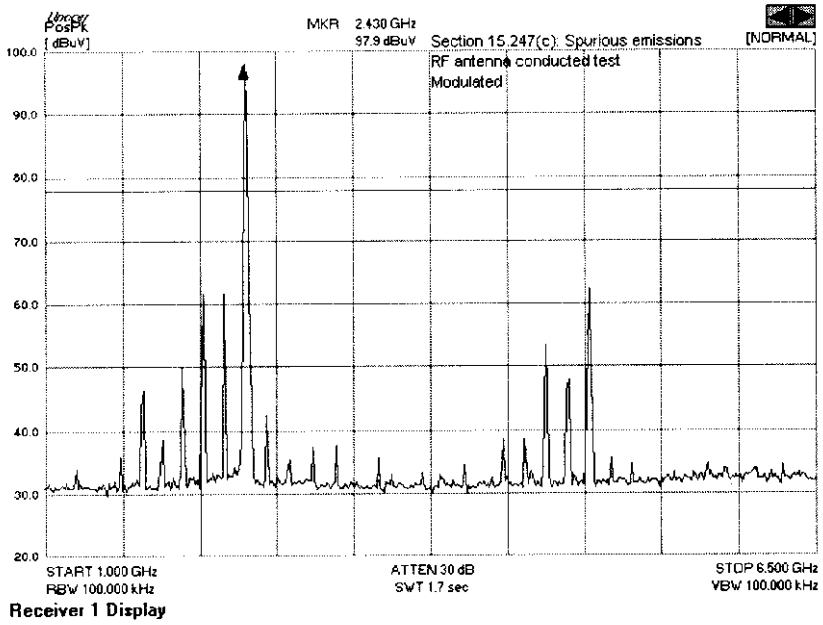
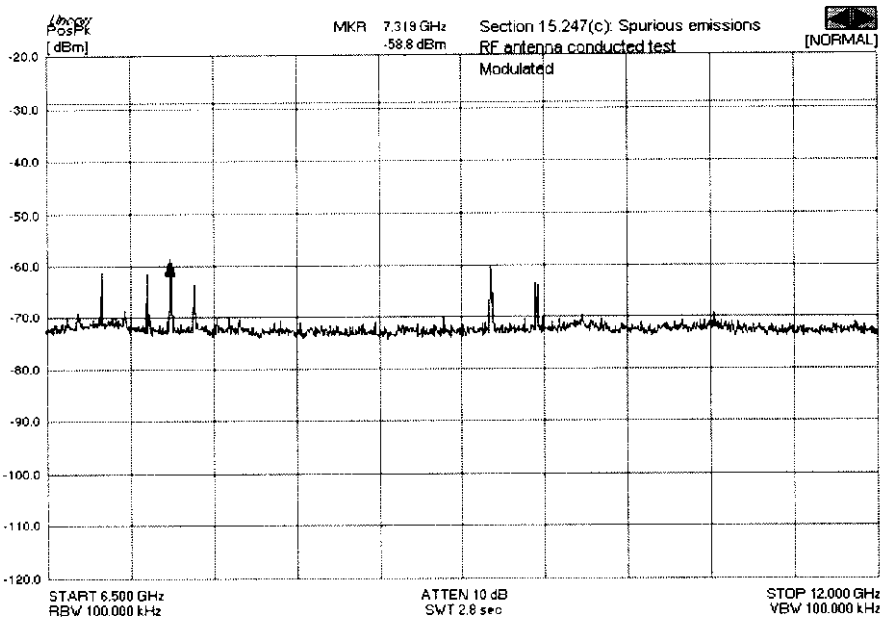
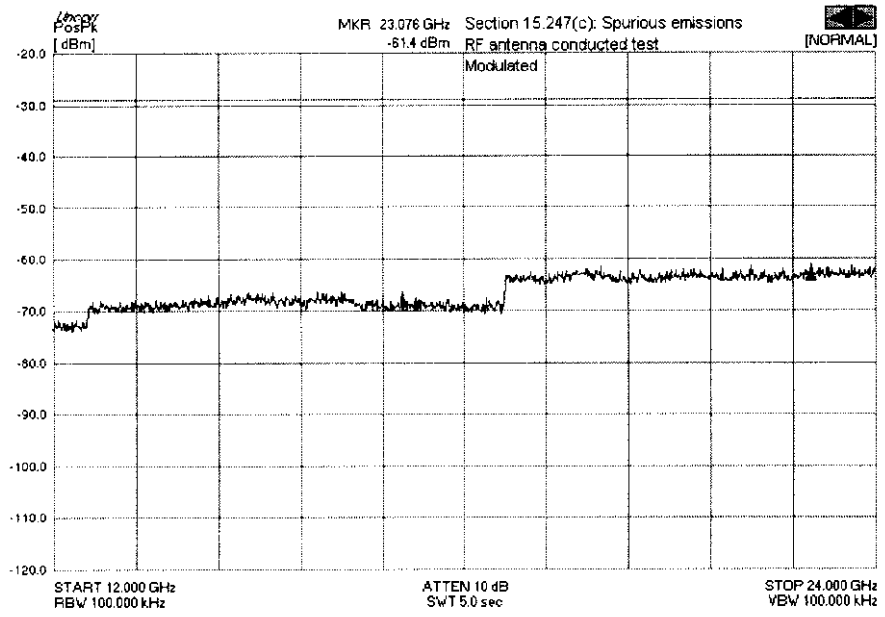


FIGURE 11: Conducted spurious emission 6.5 to 12 GHz



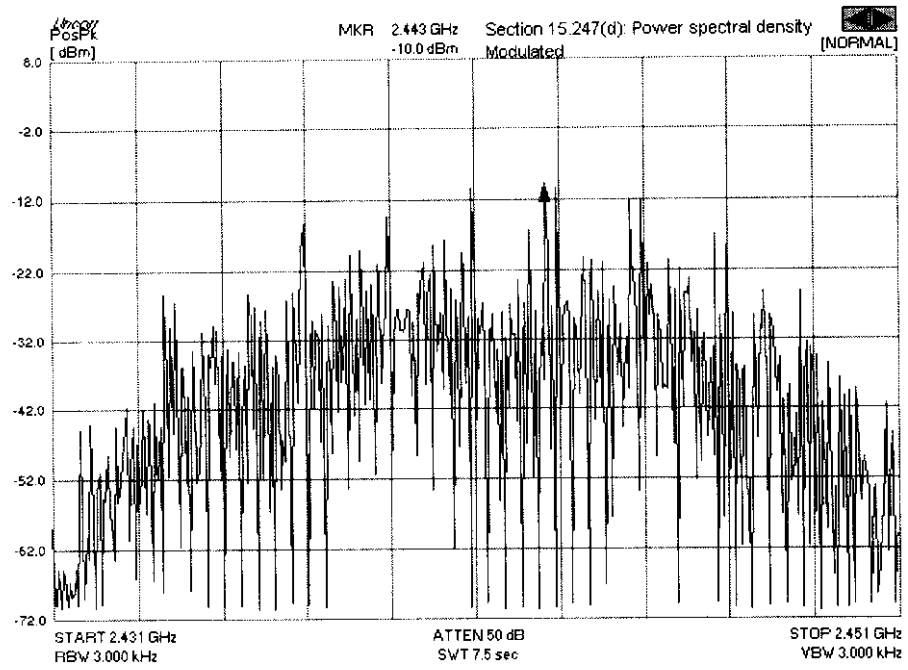

**Receiver 1 Display**

FIGURE 12: Conducted spurious emission 12 to 24GHz



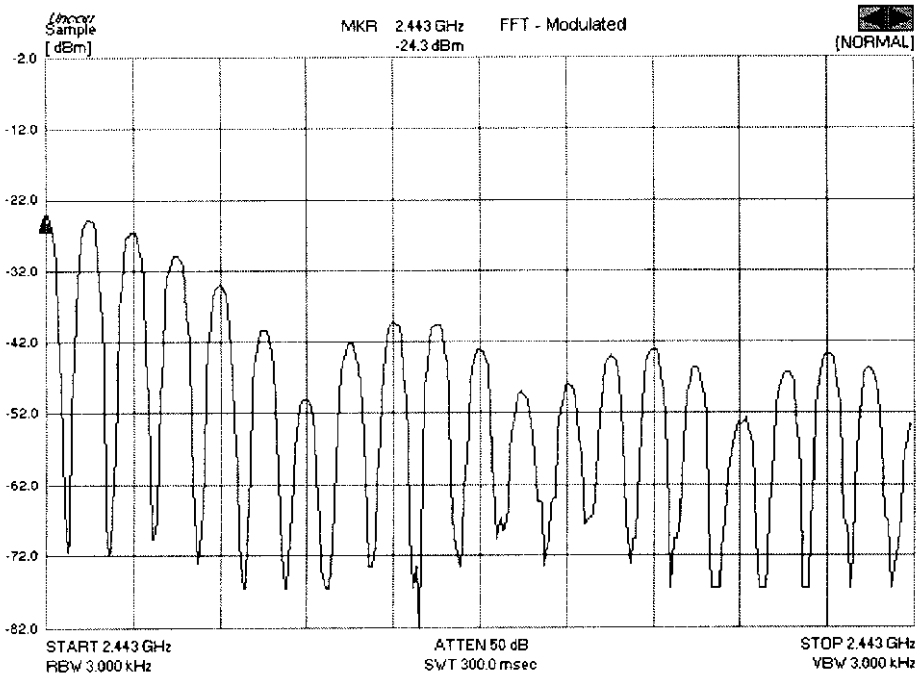

**Receiver 1 Display**

FIGURE 13: Power spectral density-modulated




**Receiver 1 Display**

FIGURE 14: FFT-modulated




**Receiver 1 Display**

FIGURE 15: Power spectral density-un-modulated

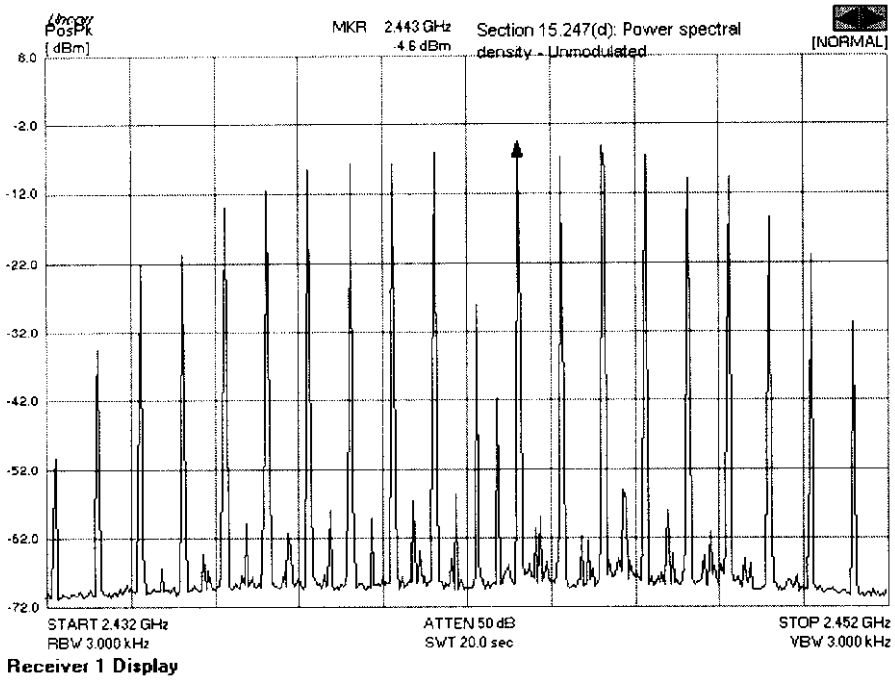



FIGURE 16: FFT-un-modulated

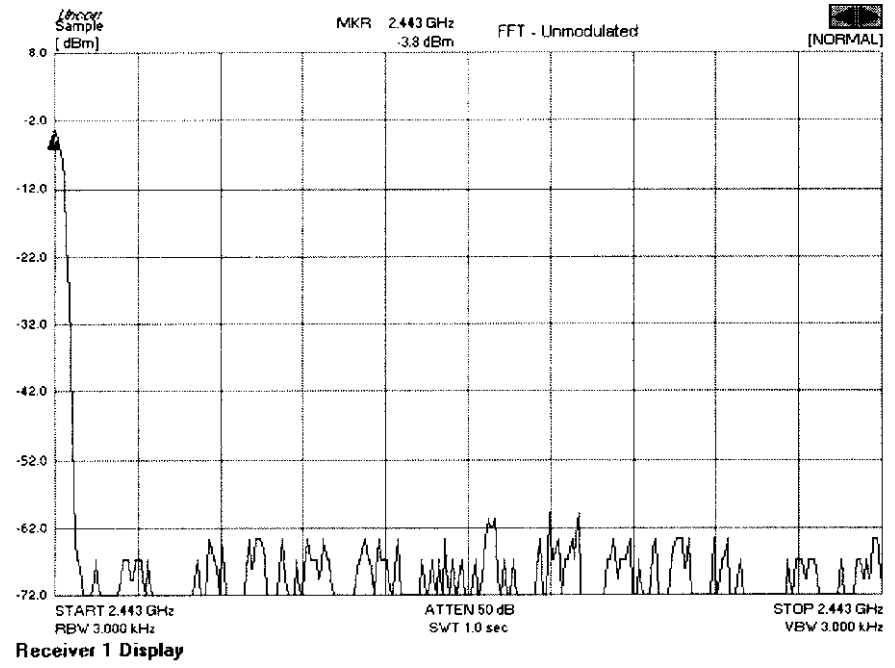


FIGURE 17: Processing gain

*Please see following page.*

# 7.0 Conducted, Field Strength Calculation, and Radiated Test Methodology

## 7.1 Conducted measurement

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

## 7.2 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(dBuV/m) = SAR(dBuV) + SCF(dB/m)$$

FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(dB/m) = -PG(dB) + AF(dB/m) + CL(dB)$$

SCF = Site Correction Factor
PG = Pre-amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(uV/m) = 10^{FI(dBuV/m)/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is -11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3 \text{ dBuV} - 11.5 \text{ dB/m} = 37.8 \text{ dBuV/m}$$

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

## 7.3 Radiated measurement

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances if necessary in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 25GHz MHz ($10^{th}$ harmonic of carrier frequency) using a Hewlett Packard 8566B spectrum analyzer, a Hewlett Packard 85650A quasi-peak adapter, HP11790 mixers, and EMCO log periodic, EMCO horn antennas and biconical antenna. In order to gain sensitivity, a cougar preamplifier (from 30 to 2GHZ), and an HP preamplifier (from 1GHz to 26.5 GHz) was connected in series between the antenna and the input of the spectrum analyzer.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB resolution bandwidth was set to 120 kHz for measurements below 1GHz, and 1MHz for measurements above 1GHz. The analyzer was operated in the CISPR quasi-peak detection mode below 1GHz and in the peak mode with 10Hz video averaging. No video filter less than 10 times the resolution bandwidth was used when measuring below 1GHz. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

*Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.*

## 8.0 CONDUCTED EMISSION DATA

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 450 kHz to 30 MHz on the HOT SIDE and NEUTRAL SIDE, herein referred to as L2 and L1.

**TABLE 1: CONDUCTED EMISSIONS**

| | EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | CORRECTED EMISSION LEVEL (dBuV) | FCC LIMIT (dBuV) (2) | FCC MARGIN (dBuV) |
|---|---|---|---|---|---|
| HOT SIDE (L2) | | | | | |
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| NEUTRAL SIDE (L1) | | | | | |
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***Note EUT is not AC powered. Conducted emission measurement was not performed.***

**(1)Pk = Peak; QP = Quasi-Peak; Av = Average**
**(2)Average limit (QP limit is provided only when a QP measurement fails the QP limit.)**

**TEST PERSONNEL:**

Signature: _____ **Date:** 4/13/98

Typed/Printed Name: K. Franck Schuppius

## 9.0 RADIATED EMISSION DATA

The following data lists the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit. Explanation of the Correction Factor is given in paragraph 6.3.

**TABLE 2: RADIATED EMISSIONS: 3 METER**

| EMISSION FREQUENCY (MHz) | ANTENNA POLARITY (H/V) | ANALYZER READING (dBuV)* | SITE CORRECTION FACTOR (dB/m) | EMISSION LEVEL (dBuV/m) | FCC LIMIT (dBuV/m) | FCC MARGIN (dBuV/m) |
|---|---|---|---|---|---|---|
| 107.132 | V | 65.2 | -27.4 | 37.8 | 43.5 | -5.7 |
| 261.074 | V | 52.2 | -22.7 | 29.5 | 46.0 | -16.5 |
| 283.074 | V | 47.8 | -22.2 | 25.6 | 46.0 | -20.4 |
| 315.728 | V | 45.3 | -21.3 | 24.0 | 46.0 | -22.0 |
| 327.074 | V | 52.1 | -20.8 | 31.3 | 46.0 | -14.7 |
| 360.832 | V | 50.9 | -20.0 | 30.9 | 46.0 | -15.1 |
| 437.074 | V | 49.7 | -18.4 | 31.3 | 46.0 | -14.7 |
| 459.074 | V | 45.9 | -17.7 | 28.2 | 46.0 | -17.8 |
| 902.080 | V | 37.9 | -9.3 | 28.6 | 46.0 | -17.4 |
| 921.073 | V | 51.3 | -9.0 | 42.3 | 46.0 | -3.7 |

**TABLE 3: RADIATED EMISSIONS: 3 METER**

| EMISSION FREQUENCY (MHz) | ANTENNA POLARITY (H/V) | ANALYZER READING (dBuV)* | SITE CORRECTION FACTOR (dB/m) | EMISSION LEVEL (dBuV/m) | FCC LIMIT (dBuV/m) 94.1 - 20 =74.1 | FCC MARGIN (dBuV/m) |
|---|---|---|---|---|---|---|
| 2.44215 | H | 93.2 | 0.9 | 94.1 | | |
| | | | | | | |
| 2.13504 | H | 31.0 | 0.4 | 31.4 | 74.1 | -42.7 |
| 2.14904 | H | 50.2 | 0.5 | 50.7 | 74.1 | -23.4 |
| 2.28833 | H | 55.8 | 0.4 | 56.2 | 74.1 | -17.9 |
| 2.44626 | H | 41.4 | 0.9 | 42.3 | 74.1 | -31.8 |
| 3.07011 | H | 41.4 | 3.6 | 45.0 | 74.1 | -29.1 |
| 3.37600 | H | 31.4 | 6.0 | 37.4 | 74.1 | -36.7 |
| 3.95263 | H | 31.0 | 7.2 | 38.2 | 74.1 | -35.9 |
| 3.99130 | H | 37.4 | -12.0 | 25.4 | 74.1 | -48.7 |
| 4.57700 | H | 58.9 | -11.6 | 47.3 | 74.1 | -26.8 |
| 4.88400 | H | 30.1 | -11.3 | 18.8 | 74.1 | -55.3 |
| 5.04044 | H | 37.1 | -11.1 | 26.0 | 74.1 | -48.1 |
| 5.19094 | H | 39.0 | -10.6 | 28.4 | 74.1 | -45.7 |
| 9.91400 | H | 41.4 | 4.1 | 45.5 | 74.1 | -28.6 |
| 9.46100 | H | 39.7 | 3.9 | 43.6 | 74.1 | -30.5 |
| 10.0750 | H | 37.3 | 5.2 | 42.5 | 74.1 | -31.6 |
| 11.9040 | H | 37.8 | 4.8 | 42.6 | 74.1 | -31.5 |

**TEST PERSONNEL:**

Signature: _____ Date: 4/13/98

Typed/Printed Name: K. Franck Schuppius

# 10.0 PHOTOS OF TESTED EUT

**The following photos are attached:**

Figure 18: EUT PCB, front side
Figure 19: EUT PCB, rear side
Figure 20: DSSNet Auxiliary Board, Component Side
Figure 21: DSSNet Auxiliary Board, Solder Side
Figure 22: Antenna, DC power cable, interface cable
Figure 23: Chassis cover, front inside cover
Figure 24: Chassis cover, back inside cover