

1.0 General Information

1.1 Product Description

The Model 2404-TX (referred to as the EUT in this report) is a 4 Port Ethernet Card. The EUT is supplied power supply through the host computer. The EUT is manufactured by Osicom Technologies, Inc.

1.2 Related Submittals

Osicom Technologies, Inc. is not submitting any other submittals related to the EUT.

1.4 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system which have grants, are:

Model & Serial Number	Manufacturer & FCC ID	Description	Cable Descriptions
(EUT) Model 2404-TX S/N: None	Osicom N442404TX	4 Port Ethernet Card	(2) 100m, Unshielded Ethernet Cables (CAT 5) to Remote System
M/N: P5-75 S/N: 3474717	Gateway 2000 HWYZAP590	Host Computer	1.8m, Unshielded Pwr Cord
M/N: S/N: 9216167978	Samtron CSYSC-431VS	VGA Monitor	1.8m, Unshielded Pwr Cord 1.2m, Integral VGA Cable
M/N: M S/N: 1391401	IBM	Key Board	Coiled, Integral Cable
M/N: 001 DL S/N: 72-0054668	IBM AN09Z66450350	Mouse	3.0m, Integral Cable
NX-1001 S/N: 510030137823	Star B6DZ150L	Parallel Printer	1.8m, Shielded data cable
Motherboard S/N:	233MHz Pentium DOC	Remote System (Computer)	1.8m, Unshielded Pwr Cord

1.5 Test Methodology

The test procedures used are in accordance with the ANSI document C63.4-1992, (July 17, 1992) "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.6 Test Facility

The open area test site used to collect the radiated data is located on 8625 Helmar Road in Newark, Illinois. The open field test site has a metal ground screen. Details of the site characteristics are on file with the FCC. Conducted emission measurements and preliminary radiated emission scans were performed in shielded enclosure "B" at Radiometrics' Romeoville, Illinois EMI test lab. These sites have been fully described in a report and accepted by the FCC in a letter dated October 1, 1996 (31040/SIT 1300F2).

Conducted emission measurements were performed using an Electrometrics Model FCC/VDE 50/2 Line Impedance Stabilization Network (LISN) as the pick-up device. This device is constructed in accordance with the circuit diagram provided in Figure 3 of ANSI document C63.4-1992.

1.7 Test Equipment

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. Below 1 GHz, when a radiated emission is detected approaching the specification limit, the measurement of the emission is repeated using a tuned dipole antenna with a Roberts Balun.

The radiated emission measurements were performed with a spectrum analyzer. The bandwidths of the spectrum analyzers are adjusted to the correct bandwidths as specified by the FCC Rules. The bandwidth used from 450 kHz to 30 MHz is 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. From 1 to 2 GHz a 1 MHz bandwidth is used. In order to increase the sensitivity of the spectrum analyzer, a preamplifier was used. The preamplifiers used had sufficient dynamic range that ensured that an overload condition was not present during the tests.

2.0 System Test Configuration

2.1 Test System and Justification

Wiring was consistent with manufacturer's recommendations. The EUT was placed inside of the host computer. A mouse, monitor and a printer were connected to the host computer.

The EUT was connected to a remote system (setup as per ANSI C63.4-1992 section 6.1.2.1) via an unshielded, CAT 5 cable. The same type cables were added to the EUT and remote system as per ANSI C63.4-1992 section 6.1.3. The end configuration was 2 cables.

Power to the EUT was supplied via the host computer.

2.2 EUT Exercise Software

The EUT was tested in normal communication during the tests. The EUT was continuously communicating with the remote system during the tests.

The EUT exercise program used during radiated and conducted testing was contained on the hard drives of the host and remote systems. The program was continuously sending and receiving packets of information at the EUT's maximum baud rate. This program ran until it was manually stopped at the end of each test.

2.3 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

2.4 Equipment Modifications

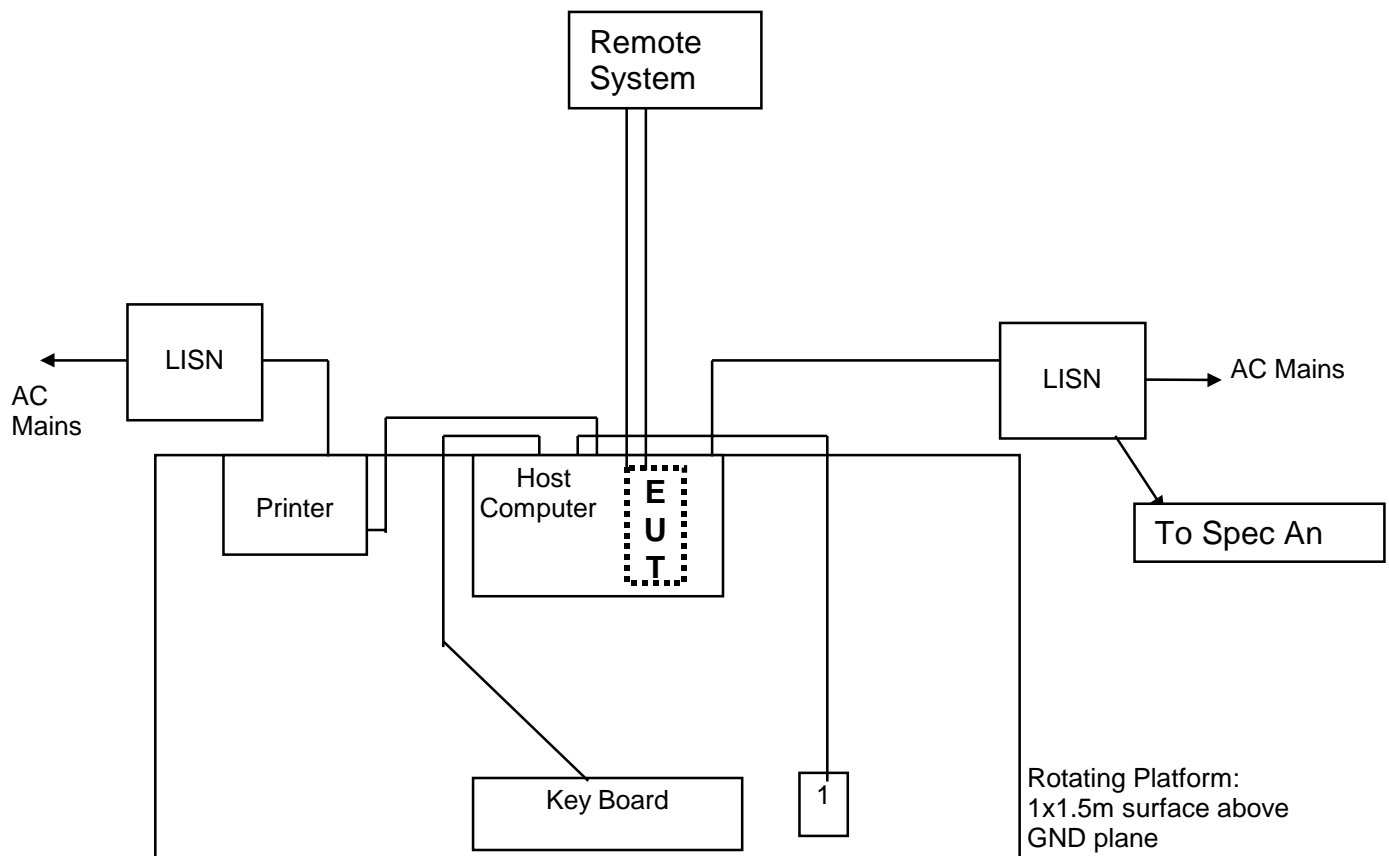
No Modifications were made to the EUT by Radiometrics Midwest Corp. to achieve compliance.

Figure 2.1 Configuration of Tested System**Conducted Emissions:**

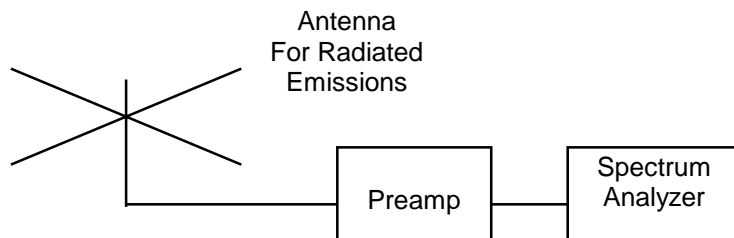
- LISN's at least 80 cm from EUT chassis
- Vertical conductive plane 40 cm from rear of table top
- EUT power cord bundled
- Test platform is not rotated

Radiated Emissions:

- LISN's not used
- AC outlet with low-pass filter at the base of the turntable
- No vertical conductive wall

**Notes:**

- Not to Scale
- Antenna height varied 1-4 meters
- Distance from antenna to tested system is 3 meters
- LISN=Line Impedance Stabilization Network



3.0 Conducted Emission Data

The initial step in collecting conducted data is a spectrum analyzer peak scan and the plotting of the measurement range. Significant peaks are then marked as shown on the following table, and these signals are then measured with the quasi-peak detector. The following represents the worst case emissions from the host computer (with the EUT connected) power cord, after testing all modes of operation.

Model : 2404-TX
 Specification : EN 55022; Class B
 Test Date : 12/01/98

Line Tested	Freq. MHz	Meter* Reading dBuV	Cable Loss dB	Strength of Signal dBuV	Limit dBuV	Margin Under Limit dB
AC Hot	0.28	39.0	0.1	39.1	60.8	21.7
AC Hot	0.42	32.1	0.1	32.2	57.5	25.3
AC Hot	12.13	32.5	0.4	32.9	60.0	27.1
AC Hot	16.83	32.1	0.5	32.6	60.0	27.4
Neutral	0.28	42.2	0.1	42.3	60.9	18.6
Neutral	0.42	35.3	0.1	35.4	57.5	22.1
Neutral	13.48	32.0	0.4	32.4	60.0	27.6
Neutral	17.69	32.3	0.5	32.8	60.0	27.2

* All reading are quasi-peak with a 9 kHz bandwidth and no video filter.

Changing the frequency of the transmitter did not affect the emissions listed above.
 Judgment: Passed by 18.68 dB

Test Personnel: Jeffrey E. Tomes
 Senior EMC Technician

4.0 Radiated Emissions Data

The following table lists the highest measured emission frequencies, and measured levels and the Class B limit. A sample calculation is given in paragraph 4.1. The analyzer readings are quasi-peak with a 120 kHz bandwidth and no video filter.

Manufacturer : Osicom
 Model : 2404-TX
 Specification : EN 55022; Class B
 Test Date : 12-01-1998
 Test Distance : 3 Meters

Notes : Pol = Antenna Polarization; V = Vertical; H = Horizontal
 BC = Biconical; LP = Log-Periodic; DP = Dipole
 Corr. Factors = cable loss - preamp gain - distance factor.

Freq. MHz	Meter Reading dBuV	Antenna Factor dB	Antenna Pol/ Type	Corr. Factors dB	Field Strength of Signal dBuV/m	Limit Field Strength dBuV/m	Margin Under Limit dB
125.0	42.4	10.5	V/DP	-26.9	26.0	30.0	4.0
136.2	37.6	11.3	V/DP	-26.8	22.0	30.0	8.0
447.2	37.7	21.6	V/DP	-25.6	33.7	37.0	3.3
644.3	32.4	24.8	V/DP	-24.8	32.4	37.0	4.6
125.0	39.6	10.5	H/DP	-26.9	23.2	30.0	6.8
38.3	38.7	12.2	V/BC	-28.3	22.6	30.0	7.4
65.8	39.8	8.2	V/BC	-24.8	23.1	30.0	6.9
70.2	41.7	6.5	V/BC	-25.0	23.2	30.0	6.8
85.9	39.3	9.6	V/BC	-26.7	22.2	30.0	7.8
98.4	37.1	12.6	V/BC	-26.9	22.7	30.0	7.3
199.9	31.2	18.0	V/BC	-26.3	22.9	30.0	7.1
218.0	35.4	11.5	V/LP	-26.3	20.7	30.0	9.3
217.9	34.9	11.5	V/LP	-26.3	20.1	30.0	9.9
615.7	32.7	19.2	V/LP	-25.1	26.8	37.0	10.2
715.9	34.6	20.9	V/LP	-24.2	31.3	37.0	5.7
198.8	27.7	18.0	H/BC	-26.3	19.5	30.0	10.5
223.6	36.1	10.9	H/LP	-26.2	20.8	30.0	9.2
250.6	33.4	12.3	H/LP	-26.1	19.6	37.0	17.4
397.6	36.6	15.4	H/LP	-25.7	26.3	37.0	10.7
670.8	29.8	22.2	H/LP	-24.7	27.3	37.0	9.7
944.2	24.0	22.8	H/LP	-17.1	29.6	37.0	7.4

Judgment: Passed by 3.3 dB

Test Personnel: Jeffrey E Tomes
 Senior EMC Technician

4.1 Field Strength Calculation

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

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 49.5 dBuV is obtained. The Antenna Factor of 8.1 and a Cable Factor of 1.7 is added. The Amplifier Gain of 23.3 dB is subtracted, giving a field strength of 36 dBuV/m. The 36 dBuV/m can be mathematically converted to its corresponding level in uV/m.

$$FS = 49.5 + 8.1 + 1.7 - 23.3 = 36.0 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(36 \text{ dBuV/m})/20] = 63.1 \text{ uV/m}$$



