L.S. Compliance, Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012
Phone: 262.375.4400 Fax: 262.375.4248

Compliance Testing of:

SLTX-Part 15

Prepared For:

MagneTek
Attn.: Mr. Daniel Beilfuss
N49 W13650 Campbell Drive
Menomonee Falls, WI 53051

Test Report Number:

305515

Test Date(s):

January 10th and 11th, 2006

Table of Contents

1. L.S. Compliance in Review

L.S. Compliance - Accreditations and Listing's

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025 : 1999
with Electrical (EMC) Scope of Accreditation
A2LA Certificate Number: **1255.01**

Federal Communications Commission (FCC) – USA

Listing of 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948
FCC Registration Number: **90756**

Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-212 – Issue 1
File Number: **IC 3088-A**

On file, 3 and 10 Meter OATS based on RSS-212 – Issue 1
File Number: **IC 3088**

U. S. Conformity Assessment Body (CAB) Validation

Validated by the European Commission as a **U. S. Competent Body** operating under the U. S. /EU, Mutual Recognition Agreement (MRA) operating under the European Union Electromagnetic Compatibility –Council Directive 2004/108/EC (formerly 89/336/EEC, Article 10.2)
Date of Validation: **January 16, 2001**

Validated by the European Commission as a **U.S. Notified Body** operating under the U.S./EU, Mutual Recognition Agreement (MRA) operating under the European Union Telecommunication Equipment – Council Directive 99/5/EC, Annex V.

Date of Validation: **November 20, 2002**
Notified Body Identification Number: **1243**

2. A2LA Certificate of Accreditation

THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

L.S. COMPLIANCE, INC.
Cedarburg, WI

for technical competence in the field of

Electrical Testing

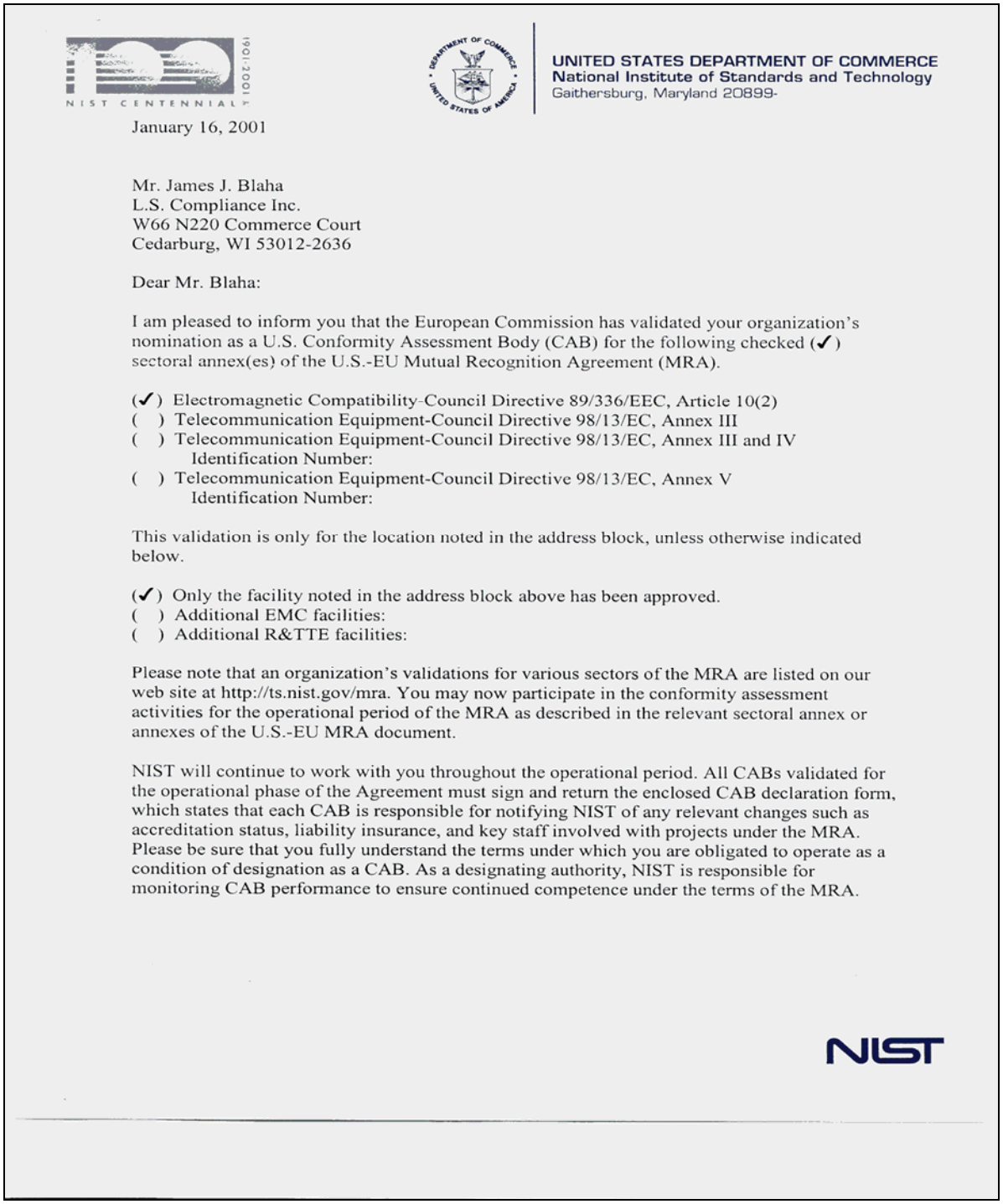
The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified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

Presented this 29th day of April 2005.

President
For the Accreditation Council
Certificate Number 1255.01
Valid to January 31, 2007

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

3. Validation Letter – U. S. Competent Body for EMC Directive 2004/108/EEC (formerly 89/336/EEC)



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

January 16, 2001

Mr. James J. Blaha
L.S. Compliance Inc.
W66 N220 Commerce Court
Cedarburg, WI 53012-2636

Dear Mr. Blaha:

I am pleased to inform you that the European Commission has validated your organization's nomination as a U.S. Conformity Assessment Body (CAB) for the following checked (✓) sectoral annex(es) of the U.S.-EU Mutual Recognition Agreement (MRA).

(✓) Electromagnetic Compatibility-Council Directive 89/336/EEC, Article 10(2)
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex III
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex III and IV
Identification Number:
( ) Telecommunication Equipment-Council Directive 98/13/EC, Annex V
Identification Number:

This validation is only for the location noted in the address block, unless otherwise indicated below.

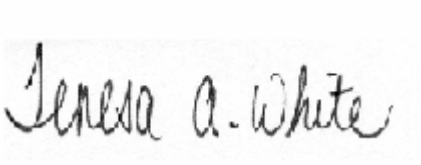
(✓) Only the facility noted in the address block above has been approved.
( ) Additional EMC facilities:
( ) Additional R&TTE facilities:

Please note that an organization's validations for various sectors of the MRA are listed on our web site at http://ts.nist.gov/mra. You may now participate in the conformity assessment activities for the operational period of the MRA as described in the relevant sectoral annex or annexes of the U.S.-EU MRA document.

NIST will continue to work with you throughout the operational period. All CABs validated for the operational phase of the Agreement must sign and return the enclosed CAB declaration form, which states that each CAB is responsible for notifying NIST of any relevant changes such as accreditation status, liability insurance, and key staff involved with projects under the MRA. Please be sure that you fully understand the terms under which you are obligated to operate as a condition of designation as a CAB. As a designating authority, NIST is responsible for monitoring CAB performance to ensure continued competence under the terms of the MRA.

NIST

4. Signature Page



Prepared By: **February 2, 2006**

Teresa A. White, Document Coordinator Date

Tested By;

Approved By: **February 2, 2006**

Kenneth L. Boston, EMC Lab Manager Date
PE # 31926 Licensed Professional Engineer
Registered in the State of Wisconsin, United States

5. Product and General Information

Manufacturer:	MagneTek					
Date(s) of Test:	January 10th and 11th, 2006					
Test Engineer(s):		Tom Smith		Abtin Spantman	√	Ken Boston
Model #:	SLTX-Part 15					
Serial #:	n/a					
Test Voltage:	7.2 VDC battery					
Operation Mode:	CW carrier, and data modulated continuous					

Environmental Conditions in the Test Lab:

Temperature:	20-25° C
Atmospheric Pressure:	86 kPa - 106 kPa
Humidity:	30-60%

6. Introduction

On January 10th and 11th, 2006, a series of Conducted and Radiated Emissions tests were performed on one sample of the MagneTek SLTX-Part 15, here forth referred to as the "Equipment Under Test" or "EUT".

These tests were performed using the test procedure outlined in ANSI C63.4, 2003 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.231(b) for a periodic operation of a low power transmitter.

All Radiated Emission tests were performed to measure the emissions in the frequency bands described later in this report, and to determine whether said emissions are below the limits established by the aforementioned standards.

These tests were performed in accordance with the procedures described in the American National Standard for methods of measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4, 2003).

Also used as a reference for the EMI Receiver specification is the International Special Committee on Radio Interference – CISPR 16-1, 2003.

7. Product Description

The SLTX-Part 15 is a portable FSK radio transmitter that provides control for various types of industrial cranes. The transmitter is powered by 7.2V/9.0V batteries. No peripheral devices are connected to the transmitter when in use.

8. Test Requirements

The EUT was tested for Conducted and Radiated Emissions, and for compliance with the limits set forth by FCC Title 47 CFR Parts 15.35, 15.205, 15.209, 15.231(a), 15.231(b) and 15.231(c) for manually operated periodic transmitters, as well as for compliance with Industry Canada RSS-210, for low power license-exempt radio-communication devices.

9. Summary of Test Report

The Equipment Under Test (EUT) was found to **MEET** the requirements as described within the specifications of FCC Title 47 CFR Part 15.231 and Industry Canada RSS-210, Section 6.1 for a low power transmitter.

Some emissions are seen to be within 3dB of their respective limits. As these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

The enclosed test results pertain to the sample(s) of the test item listed, and only for the tests performed on the data sheets. Any subsequent modification or changes to the test items could invalidate the data contained herein, and could therefore invalidate the findings of this report.

10. Radiated Emissions Test

Test Setup

The EUT was operated within the 3 Meter FCC listed Semi-Anechoic Chamber, located at L.S. Compliance, Inc., in Cedarburg, Wisconsin. The EUT was placed on an 80cm high, non-conductive pedestal, which was centered on a flush-mounted 2m diameter metal turntable. The EUT was configured to run in a continuous CW transmit mode during the 15.231(a) and 15.231(b) measurements. The EUT was then returned to normal operation for measurements of the data packet length and occupied bandwidth, while modulated with data packets.

Test Procedure

The fundamental and spurious (harmonic) emissions of the transmitter were tested for compliance to FCC Title 47 CFR Part 15.231(b) limits for manually operated periodic devices.

The EUT was tested from the lowest frequency generated by the transmitter (without going below 9 kHz) to the 10^{th} harmonic of the fundamental frequency generated by the device. The appropriate limits were also observed when the fundamental or spurious signals were located within any of the restricted bands as described in FCC Part 15.205(a).

The EUT was placed on an 80cm high non-conductive pedestal, with the Antenna Mast placed 3 m from the EUT. A Biconical Antenna was used to measure emissions from 30 MHz to 300 MHz, a Log Periodic Antenna was used to measure emissions from 300 MHz to 1000 MHz, and a Double Ridged Waveguide Horn Antenna was used to measure emissions above 1 GHz.

The EUT was configured to operate in a continuous c.w. transmit mode. The resultant signals from the fundamental harmonics and spurious signals were maximized by rotating the turntable 360 degrees, and by raising and lowering the Antenna between 1 and 4 meters. The EUT was also given three different orientations to determine the maximum signal levels, using both horizontal and vertical antenna polarities.

The battery voltage was monitored to ensure proper level, and recharged as necessary during the test sequence.

Test Results

No significant emissions were found, aside from the transmitter fundamental and harmonics, and some low frequency spurious emissions. The unit was scanned for emissions over the range of 30 MHz to 4400 MHz to establish compliance with FCC Parts 15.231 and 15.205 while in a continuous transmit mode. A numeric list of measured emissions appears in the Data Chart(s) of this report.

Occupied Bandwidth

In addition to measuring the levels of Radiated Emissions, the Occupied Bandwidth of the transmitter was measured. In accordance with FCC Part 15.231(c), the 20 dB bandwidth of the transmitted signal should be within a window of 0.25% of the center carrier frequency. The resolution bandwidth was set to the closest available filter setting on the HP 8546A EMI Receiver, then corresponded to 5% of the allowable bandwidth determined in the calculation mentioned above, without going below the resolution bandwidth of 10 kHz, as dictated in ANSI C63.4, 2003, Section 13.1.7.

The EUT was activated to transmit in a continuous (normal) mode and was placed on the aforementioned test configuration within the 3 Meter Chamber. The transmitted signal was received on a Log Periodic Antenna and provided to the HP 8546A EMI Receiver, where the fundamental frequency was displayed, and a plot of the Occupied Bandwidth was produced. The measured Occupied Bandwidth of 157 kHz is within the calculated limit of 1090 kHz. This result is the highest bandwidth observed, for the middle channel at 436 MHz. Results can be seen in the Occupied Bandwidth scans in this report.

Test Equipment Utilized

A list of the test equipment used for the Radiated Emissions tests can be found in Appendix C of this report. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All antenna calibrations were performed at a N.I.S.T. traceable site, and the resultant correction factors were entered into the HP 8546A EMI Receiver software database.

The connecting cables used were also measured for loss using a calibrated Signal Generator and the HP 8546A EMI Receiver. The resulting loss factors were entered into the HP 8546A EMI Receiver database. This allowed for automatic change in the antenna correction factor. The resulting data taken from the HP 8546A EMI Receiver is an actual reading and can be entered into the database as a corrected meter reading.

When a reading is taken using the Peak Detector, a duty cycle correction factor can be applied for conversion to an average reading. This operation can be used when measuring short-duration bursts of data transmission, under FCC Part 15.231.

The resultant average reading can then be compared to the appropriate limit in order to determine compliance with the limits. The HP 8546A EMI Receiver was operated with a resolution bandwidth of 120 kHz for measurements below 1 GHz (video bandwidth of 300 kHz), and a bandwidth of 1 MHz for measurements above 1 GHz (video bandwidth of 1 MHz).

Radiated Emissions Data Chart

3 Meter Measurements of Electromagnetic Radiated Emissions
Within the 3 Meter FCC Listed Semi-Anechoic Chamber
Test Standard: FCC Parts 15.205, 15.209 and 15.231(b)
Frequency Range Inspected: 30 MHz to 4400 MHz

Manufacturer:	MagneTek										
Date(s) of Test:	January 10th and 11th, 2006										
Test Engineer:		Abtin Spantman				Tom Smith	√	Ken Boston			
Model #:	SLTX-Part 15										
Serial #:	n/a										
Voltage:	7.2 VDC battery										
Configuration:	CW Mode										
Detectors Used:		√	Peak		Quasi-Peak		Average				

Environmental Conditions in the Lab:
Temperature: 20 – 25°C
Atmospheric Pressure: 86 kPa – 106 kPa
Relative Humidity: 30 – 60 %

Test Equipment Used:
EMI Measurement Instrument: HP8546A
Biconical Antenna: EMCO #93110
Log Periodic Antenna: EMCO #93146
Horn Antenna: EMCO #3115

The table depicts the level of significant radiated emissions found:

Frequency (MHz)	Antenna Polarity	Height (m)	Azimuth (Degree)	EMI Meter Reading (dBµ V/m)	Duty Cycle Allowance (dB)	Corrected Reading (dBµV/m)	15.205 15.231(b) Limit (dBµV/m)	Margin (dB)
110.6	H	1.7	340	45.4	9.9	35.5	43.5	8.0
162.2	V	1.0	195	37.8	9.9	27.9	43.5	15.6
165.9	V	1.0	0	37.8	9.9	27.9	43.5	15.6
169.6	V	1.0	180	34.9	9.9	25.0	43.5	18.5
173.2	V	1.0	205	39.0	9.9	29.1	43.5	14.4

CW Mode: Low Channel = 430.0 MHz

The table depicts the level of significant radiated emissions found:

Frequency (MHz)	Antenna Polarity	EUT Orientation	Height (m)	Azimuth (Degree)	EMI Meter Reading (dBμ V/m)	Duty Cycle Allowance (dB)	Corrected Reading (dBμV/m)	15.231(b) Limit (dBμV/m)	Margin (dB)
430.0	V	B (back)	1.2	215	90.5	9.9	80.6	80.7	0.1
860.1	H	S (side)	1.0	15	58.5	9.9	48.6	60.7	12.1
1290.1	H	B (back)	1.0	210	44.1	9.9	34.2	60.7	26.5
1720.1	H	F (front)	1.15	300	54.0	9.9	44.1	54.0	9.9
2150.2	V	F (front)	1.0	300	48.0	9.9	38.1	60.7	22.6

CW Mode: Middle Channel = 436.0 MHz

The table depicts the level of significant radiated emissions found:

Frequency (MHz)	Antenna Polarity	EUT Orientation	Height (m)	Azimuth (Degree)	EMI Meter Reading (dBμ V/m)	Duty Cycle Allowance (dB)	Corrected Reading (dBμV/m)	15.231(b) Limit (dBμV/m)	Margin (dB)
436.0	V	B (back)	1.2	210	90.5	9.9	80.6	80.9	0.3
872.1	V	S (side)	1.35	205	56.4	9.9	46.5	60.9	14.4
1308.1	H	B (back)	1.0	200	40.9	9.9	31.0	54.0	23.0
1744.2	V	F (front)	1.0	230	56.0	9.9	46.1	60.9	14.8
2180.2	V	F (front)	1.0	300	47.6	9.9	37.7	60.9	23.2

CW Mode: High Channel = 439.8 MHz

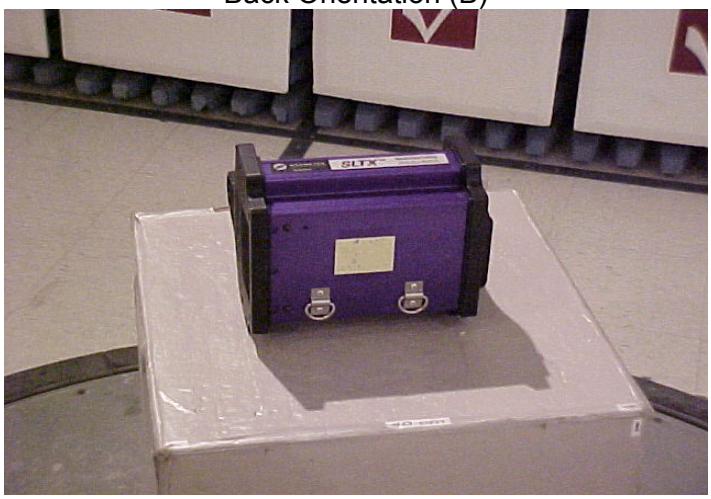
The table depicts the level of significant radiated emissions found:

Frequency (MHz)	Antenna Polarity	EUT Orientation	Height (m)	Azimuth (Degree)	EMI Meter Reading (dBμ V/m)	Duty Cycle Allowance (dB)	Corrected Reading (dBμV/m)	15.231(b) Limit (dBμV/m)	Margin (dB)
439.8	V	B (back)	1.15	220	88.2	9.9	78.3	81.0	2.7
879.6	V	B (back)	1.05	245	64.1	9.9	54.2	61.0	6.9
1319.5	H	B (back)	1.0	75	47.2	9.9	37.3	54.0	16.7
1759.4	V	F (flat)	1.3	240	57.7	9.9	47.8	61.0	13.2
2199.0	V	F (flat)	1.0	300	47.0	9.9	37.1	61.0	23.9

Photo(s) of Radiated Emission Test Setup

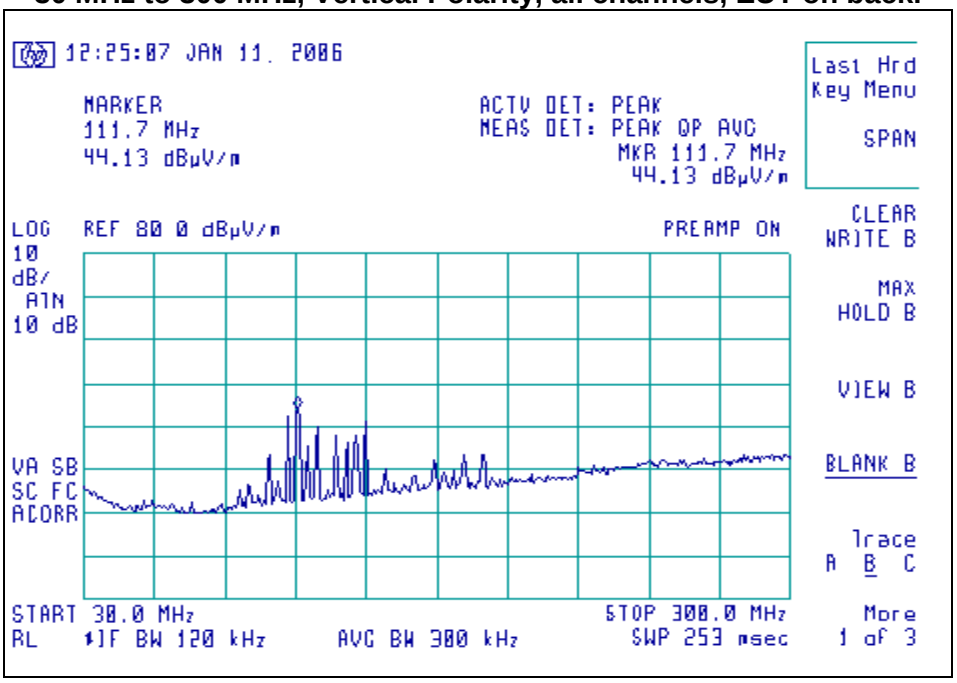
Flat orientation (F)

Back Orientation (B)

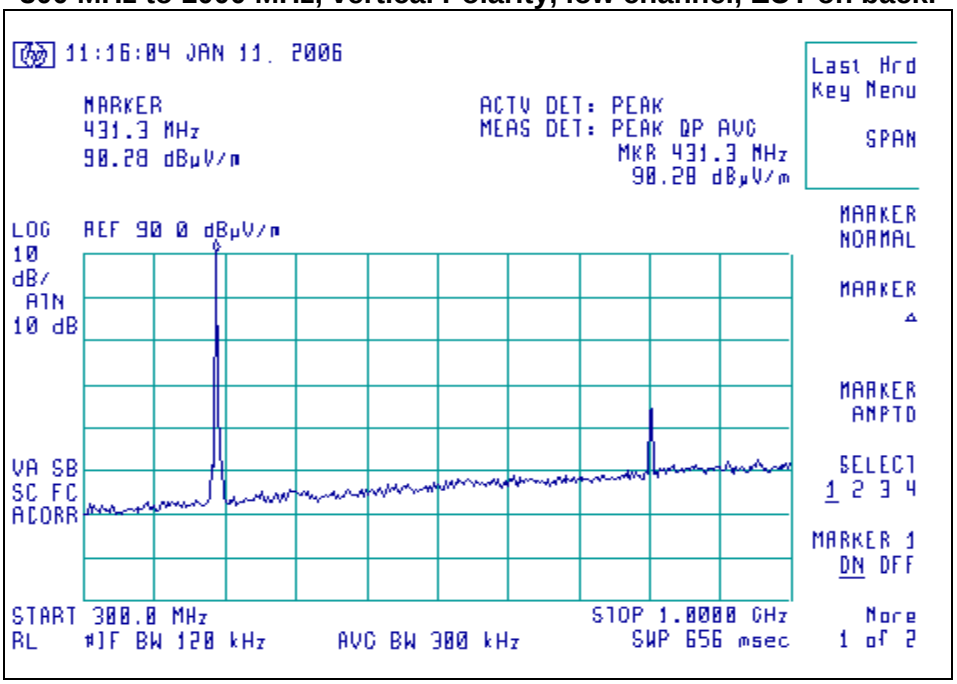


Side orientation (S)

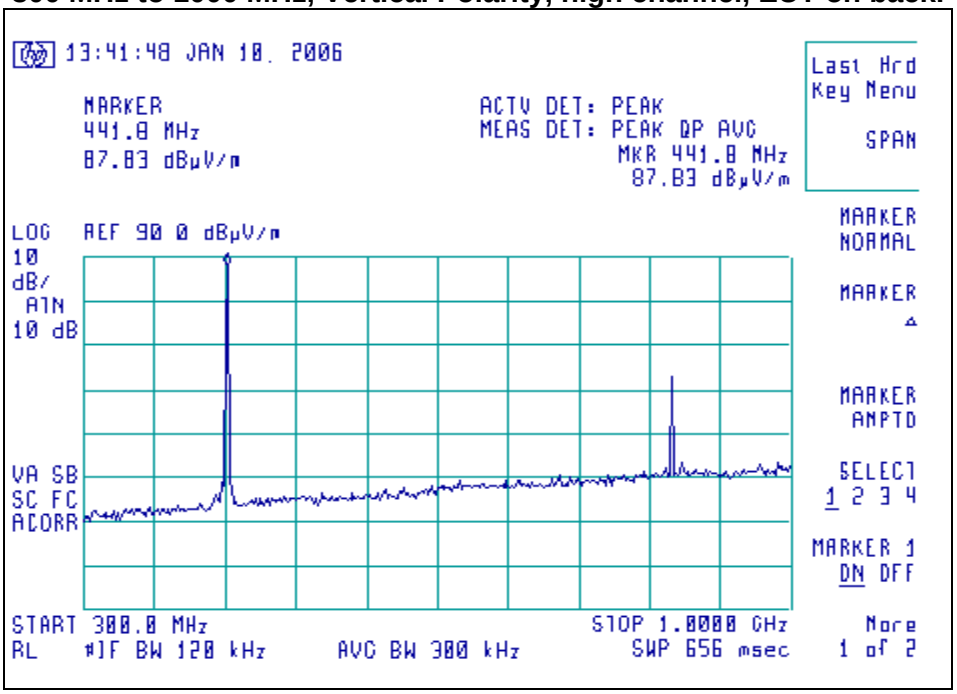
Signature Scan of Peak Radiated Emissions
30 MHz to 300 MHz, Vertical Polarity, all channels, EUT on back.



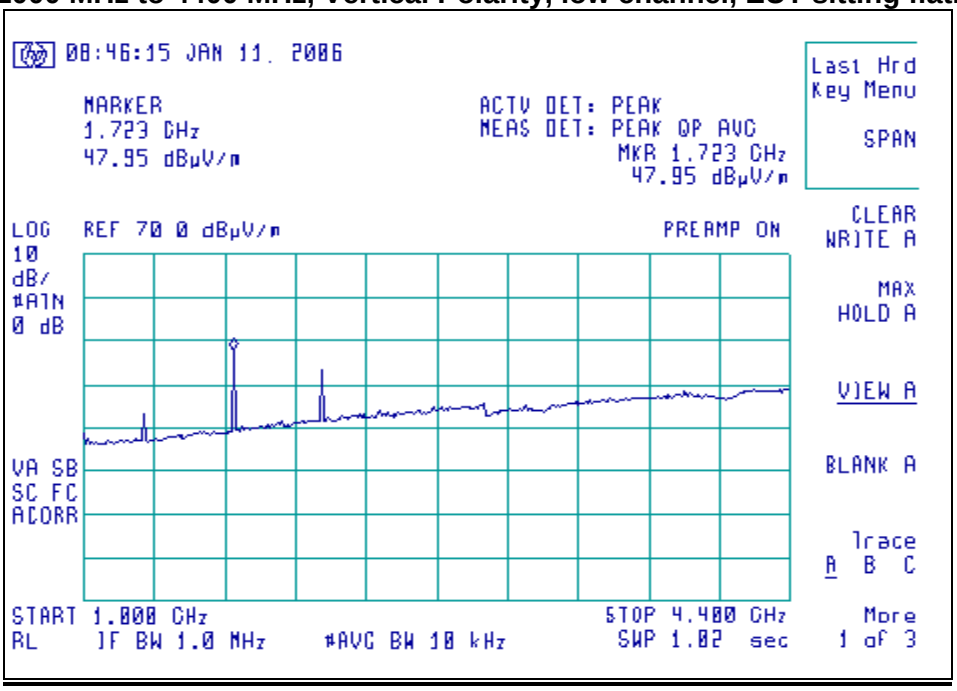
Signature Scan of Peak Radiated Emissions
300 MHz to 1000 MHz, vertical Polarity, low channel, EUT on back.



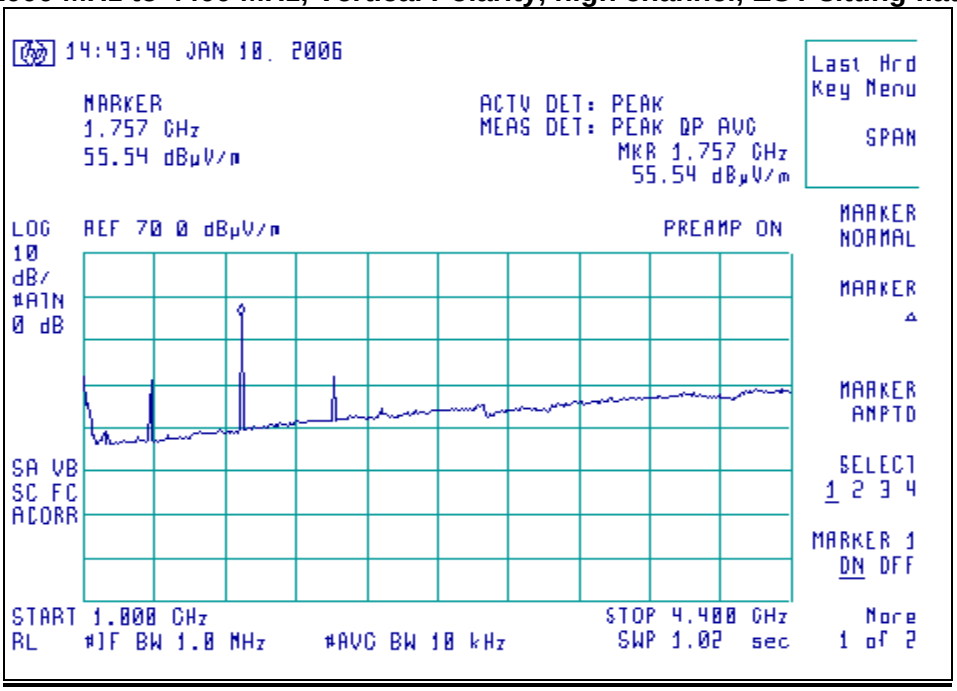
Signature Scan of Peak Radiated Emissions
300 MHz to 1000 MHz, Vertical Polarity, high channel, EUT on back.



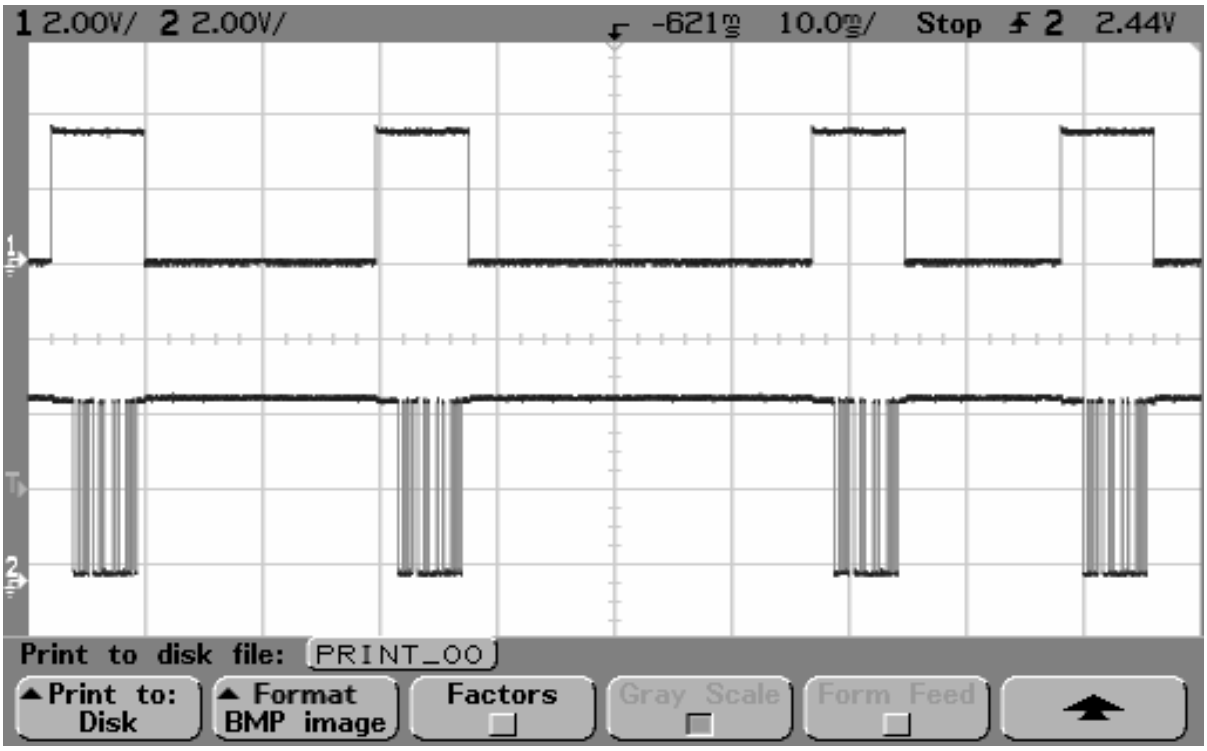
Signature Scan of Peak Radiated Emissions
1000 MHz to 4400 MHz, Vertical Polarity, low channel, EUT sitting flat.



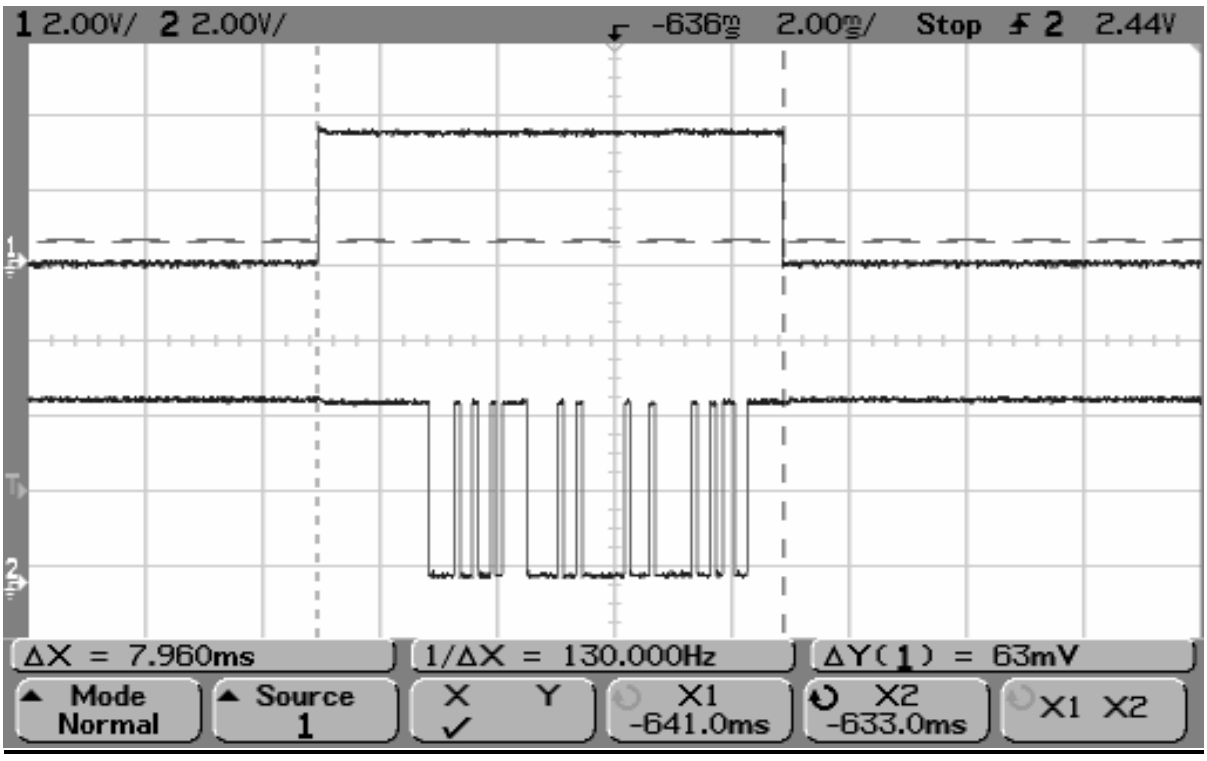
Signature Scan of Peak Radiated Emissions
1000 MHz to 4400 MHz, Vertical Polarity, high channel, EUT sitting flat.



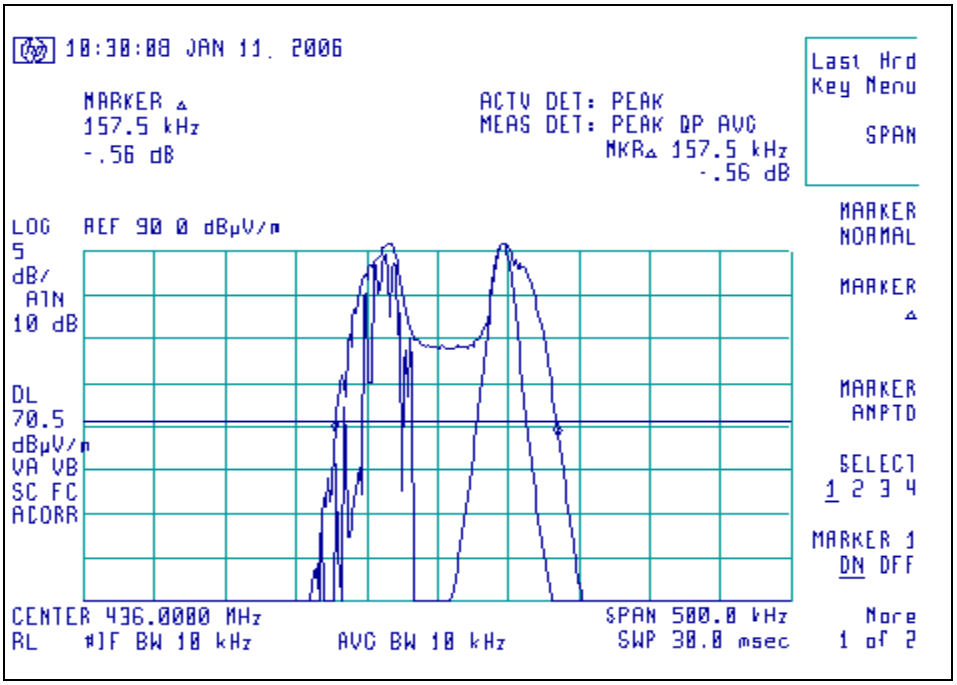
Data Packet Detail – oscilloscope probe on data and TX enable lines, 100 ms Window



Individual Data Packet Detail



Occupied Bandwidth, worst case observed, middle channel



11. Conducted Emissions Test (AC Line)

This test was not required, as the transmitter is battery operated.

APPENDIX A

CALCULATIONS

Manufacturer: MagneTek
Model: SLTX-Part 15
Serial: n/a

CALCULATION OF RADIATED EMISSIONS LIMITS FOR FCC PARTS 15.209, and 15.231(b) (260-470 MHz)

FIELD STRENGTH OF FUNDAMENTAL FREQUENCIES:
The calculation involves a linear interpolation of 3750 to 12500 µV/m over 260-470 MHz, where field strength of the fundamental frequency (f_0) when $260 \leq f_0 \leq 470$ MHz, can be found by: $3750 + 41.6667 (f_0 – 260)$, where f_0 is in MHz.

FIELD STRENGTH OF SPURIOUS/HARMONIC FREQUENCIES:
The spurious and harmonic emissions are subject to the limits expressed in FCC Parts 15.205 and 15.209, if within the restricted bands and dictated by the following calculation elsewhere.

The calculation involves a linear interpolation of 375 to 1250 µV/m over 260 to 470 MHz, where field strength of the harmonic frequencies ($2f_0$, $3f_0$…) when $260 \leq f_0 \leq 470$ MHz, can be found by: $375 + 4.1667(f_0 – 260)$, where f_0 is in MHz.

At fundamental frequency f_0 = 430 MHz

Fundamental Limit: 3750 + 41.6667 (430.0 – 260) = 10,833 µV/m @ 3m
Harmonic Limit: 375 + 4.1667 (430 – 260) = 1083.3 µV/m @ 3m

Frequency (MHz)	Fundamental Limit (µV/m @ 3m)	Fundamental Limit (dBµV/m @ 3m)	Harmonic Limit (µV/m @3m)	Harmonic Limit (dBµV/m @ 3m)
430	10,833	80.69	1083.3	60.69
436	11,084	80.89	1108.4	60.89
439.8	11,242	81.02	1124.1	61.02

APPENDIX B

DUTY CYCLE CORRECTION

For a graphical presentation of the data packets from the transmitter, refer to the Data Packet Detail – Radiated Emissions in this report. These images were captured on an oscilloscope, while probing the data and TX enable lines, feeding into the transmitter. The transmitter was functioning in a continuous operating mode, and activated by pushing in the e-stop button, which started a continuous data packet stream.

Average (Relaxation) Factor

Average Factor = 20 * Log_{10} (Worst Case EUT On-time over 100 ms time window)

The spacing between adjacent data packets is pseudo-random, but was inspected and found to have no greater than 4 packets in any 100 ms window. Therefore, the transmit enable line timing, multiplied by 4, will give the maximum total transmit time in a 100 ms window. This transmit packet total occupies 4 X 7.96 ms of time, within any 100 ms window. Therefore, the relaxation factor allowance is calculated as:

Average Factor = 20 * Log_{10} (31.84 / 100 ms) = 9.94 dB

A relaxation factor of 9.9 dB would be allowable for this product.

OCCUPIED BANDWIDTH CALCULATIONS

FCC Part 15.231(c) states that the bandwidth of a manually operated device shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz and 900 MHz.

Said bandwidth is determined at the -20 dB reference to peak carrier points.

Refer to the set of screen captures in this report, which show the actual Occupied Bandwidth of the transmitters as measured.

For this device, operating at a center frequency of 436.0 MHz, the allowed Occupied Bandwidth is calculated to be:

436.0 MHz X 0.0025 = 1.09 MHz

APPENDIX C - Test Equipment List

Asset #	Manufacturer	Model #	Serial #	Description	Date	Due
AA960008	EMCO	3816/2NM	9701-1057	Line Impedance Stabilization Network	9/27/05	9/27/06
AA960031	HP	119474A	3107A01708	Transient Limiter	Note 1	Note 1
AA960077	EMCO	93110B	9702-2918	Biconical Antenna	9/27/05	9/27/06
AA960078	EMCO	93146	9701-4855	Log-Periodic Antenna	9/27/05	9/27/06
AA960081	EMCO	3115	6907	Double Ridge Horn Antenna	12/07/05	12/07/06
CC00221C	Agilent	E4407B	US39160256	Spectrum Analyzer	12/29/05	12/29/06
EE960004	EMCO	2090	9607-1164	Device Controller	N/A	N/A
EE960013	HP	8546A	3617A00320	Receiver RF Section	9/29/05	9/29/06
EE960014	HP	85460A	3448A00296	Receiver Pre-Selector	9/29/05	9/29/06
N/A	LSC	Cable	0011	3 Meter ½" Armored Cable	Note 1	Note 1
N/A	LSC	Cable	0050	10 Meter RG 214 Cable	Note 1	Note 1
N/A	Pasternack	Attenuator	N/A	10 dB Attenuator	Note 1	Note 1

Note 1 - Equipment calibrated within a traceable system.

Uncertainty Statement

This uncertainty represents an expanded uncertainty
expressed at approximately the 95% confidence level, using a coverage factor of k=2.

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.24 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.8 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.18 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.92 dB
Conducted Emissions	Shielded Room/EMCO LISN	1.60 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	1.128 Volts/Meter
Conducted Immunity	3 Volts level	1.0 V