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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 15, Subpart C Specifications for an Intentional Radiator, Industry Canada Radio Standards Specification 210 and FCC Part 15, Subpart B Specifications for a Receiver on the Lasershield Systems, Inc. Model: Key Chain Remote (KR)

FCC ID:	RIHK0011500
GRANTEE:	Lasershield Systems, Inc. 5931 Sea Lion Place, Suite114 Carlsbad, CA. 92008
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	October 13, 2003
FINAL TEST DATE:	September 25, 2003
AUTHORIZED SIGNATORY:	Mark Briggs Director of Engineering

ACCREDITED

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SCOPE

An electromagnetic emissions test has been performed on the Lasershield Systems, Inc. model Key Chain Remote (KR) pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and Industry Canada Radio Standards Specification RSS-210 for Low Power, License-Exempt Radio Communication Devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

The transmitter detailed above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC and Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Lasershield Systems, Inc. model Key Chain Remote (KR) and therefore apply only to the tested sample. The sample was selected and prepared by Dennis Perry of Lasershield Systems, Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators and Industry Canada RSS-210 for Low Power, License-Exempt Radio Communication Devices. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules and Industry Canada Radio Standards Procedure RSP-100.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

STATEMENT OF COMPLIANCE

The tested sample of Lasershield Systems, Inc. model Key Chain Remote (KR) complied with the requirements of Subpart C of Part 15 of the FCC Rules for low power intentional radiators and Industry Canada specification RSS 210 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands).

Maintenance of FCC compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TEST RESULTS SUMMARY

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
15.207 / 15.107		AC Conducted Emissions, 0.15 – 30 MHz	Unit is battery powered	N/A
	6.6 / 7.4	AC Conducted emissions 0.45 – 30 MHz	Unit is battery powered	N/A
15.231 (a) (1)	6.1.1(a) (1)	Duration of manually activated transmission	All transmissions manually activated have a duration of less than 5 seconds from the instant the button is released	Complies
15.231 (a) (2)	6.1.1(a) (2)	Duration of automatically activated transmission	All transmissions automatically activated are less than 5 seconds in duration.	Complies (Note 1)
15.231 (a) (3)	6.1.1(a) (3)	Transmissions at predetermined / regular intervals are not permitted	There are no predetermined/regular transmissions.	Complies
15.231 (a) (4)	6.1.1(a) (4)	Pendency of transmissions used during emergencies involving fire, security, and safety of life		N/A
15.231 (b)	6.1.1(b) / Table 1	Transmitter Radiated Emissions, 418 MHz	74.0dBuV/m @ 3m (-6.2dB)	Complies (note 2)
15.231 (b)	6.1.1(b) / Table 1	Transmitter Radiated Spurious Emissions, 30-4180 MHz	39.5dBuV/m @ 836.0MHz (-20.7dB)	Complies (note 2)
15.231 (c)	6.1.1 (c)	Bandwidth	Measured bandwidth was 645 kHz. The maximum permitted is 0.25% of the fundamental frequency (1MHz)	Complies
15.231 (d)	6.1.1 (d)	Frequency Stability	N/A for devices operating at 418 MHz	N/A
15.231 (e)	6.1.1 (e)			
15.109	7.3	Receiver Spurious Emissions	The device is not a receiver	N/A

Note 1 – Refer to the operational description included with this application for detailed description and timing diagrams for transmission duration.
Note 2 – As the device is intended for hand-held operation it was tested in all three orthogonal orientations.

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Lasershield Systems, Inc. model Key Chain Remote (KR) is one part of a wireless intruder detection system with the capability to dial in to a remote security service. The Key Chain Remote (KR) is a hand-held 418MHz transmitter than can be used to wirelessly activate or deactivate the Master Alarm Unit.

All transmissions by the keyfob are manually triggered and do not occur at predetermined intervals. All transmissions from the keyfob are less than 5 seconds in duration. All transmissions are at 418 MHz and use FSK modulation. They all meet the requirements of FCC Part 15.231(a) and RSS 210 section 6.1.1(a).

The sample was received on September 23, 2003 and tested on September 25, 2003. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Lasershield Systems	Keyfob (KR)	Key Chain Remote		RIHK0011500

ENCLOSURE

The KeyFob enclosure is primarily constructed of injection molded plastic. It measures approximately 4.5 cm wide by 2.3 cm deep by 6.3 cm high.

SUPPORT EQUIPMENT

No support equipment was used during emissions testing as the device does not have any interface ports.

EUT OPERATION

For measurements of emissions from the transmitters the WDU and Key Chain Remote (KR) were configured to transmit continuously.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on September 25, 2003 at the Elliott Laboratories Open Area Test Site #2 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions, which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS, SECTION 15.207 & 15.107(a)

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

CONDUCTED EMISSIONS SPECIFICATION LIMITS, RSS 210

Frequency Range (MHz)	Class B Limit (uV)	Class B Limit (dBuV)
0.450 to 30.000	250	48

FUNDAMENTAL AND HARMONIC LIMITS 15.231 (b) / RSS 210 Table 1

The table below shows the limits for both the Fundamental and Harmonic emissions for each frequency band of operation detailed in Section 15.231 (b) for control signals.

Operating Frequency (MHz)	Field strength (microvolts/m)	Harmonics (microvolts/m)
70 - 130	1250	125
130 - 174	1250 - 3750	125 - 375
174 – 260	3750	375
260 – 470	3750 – 12,500	375 - 1250
Above 470	12,500	1250

FUNDAMENTAL AND HARMONIC LIMITS 15.231 (e)/RSS 210 Table 4

The table below shows the limits for both the Fundamental and Harmonic emissions (that do not fall in restricted bands) for each frequency band of operation detailed in Section 15.231 (e) for data signals.

Operating Frequency (MHz)	Field strength (microvolts/m)	Harmonics (microvolts/m)
70 - 130	500	50
130 - 174	500 - 1500	50 - 150
174 – 260	1500	150
260 – 470	1500 – 5000	150 - 500
Above 470	5000	500

RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.209 / RSS 210 Table 3

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.109(a) (RECEIVER)

The table below shows the limits for emissions from the receiver.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 1000 MHz, 23-Sep-03
Engineer: Mhill

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Biconical Antenna, 30-300 MHz	3110B	363	24	5/28/2002	5/28/2004
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1347	12	10/30/2002	10/30/2003
Rohde & Schwarz	Test Receiver, 20-1300MHz	ESVP	273	12	2/13/2003	2/13/2004

Conducted Emissions, 23-Sep-03
Engineer: jgonzalez

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	372	12	7/17/2003	7/17/2004
Rohde & Schwarz	Test Receiver, 0.009-30 MHz	ESH3	274	12	1/24/2003	1/24/2004
Solar Electronics Co	LISN	8028-50-TS-24-BNC support	904	12	8/7/2003	8/7/2004

Radiated Emissions, 30 - 6500 MHz, 25-Sep-03
Engineer: Chris

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	487	12	4/24/2003	4/24/2004
EMCO	Log Periodic Antenna, 0.2-2 GHz	3148	1321	12	3/31/2003	3/31/2004
Filtek	High Pass Filter, 1GHz	HP12/1000-5BA	956	12	3/11/2003	3/11/2004
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	12	1/24/2003	1/24/2004
Rohde & Schwarz	Test Receiver, 0.009-2000 MHz	ESN	1332	12	7/24/2003	7/24/2004
Hewlett Packard	Spectrum Analyzer, 9KHz - 22GHz	8593EM	1319	12	11/19/2002	11/19/2003

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T52793 7 Pages

Elliott

EMC Test Data

Client:	LaserShield	Job Number:	J52784
Model:	MAU, WDU and KeyFob	T-Log Number:	T52793
		Account Manager:	Danni Olivas
Contact:			
Emissions Spec:	FCC 15B; 15.231; RSS210	Class:	B
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

LaserShield

Model

MAU, WDU and KeyFob

Date of Last Test: 9/25/2003

Client:	LaserShield	Job Number:	J52784
Model:	MAU, WDU and KeyFob	T-Log Number:	T52793
		Account Manager:	Danni Olivas
Contact:	Enter contact name on cover shee		
Emissions Spec:	FCC 15B; 15.231; RSS210	Class:	B
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is a wireless intruder detection system with the capability to dial in to a remote security service. The system consists of a Master Alarm Unit, a Wireless Detection Unit and a Key Chain Remote (KR).

The Master Alarm Unit (MAU) contains a 418MHz receiver and integrated modem. It is intended for desktop use. It is powered from an external AC-DC adapter.

The Wireless Detection Units (WDU) contains a 418MHz transmitter and a motion sensor that will transmit to the MAU when the motion sensor detects motion.

The Key Chain Remote is a hand-held 418MHz transmitter than can be used to wirelessly activate or deactivate the Master Alarm Unit.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Lasershield Systems	MAU	Master Alarm Unit		DoC
Lasershield Systems	WDU	Wireless Detection Unit		RIHW0013300
Lasershield Systems	Keyfob (KR)	Key Chain Remote		RIHK0011500
MEI AH Electrical & Industry (HK) Limited	ED24468	Power supply		
Oriental Hero	OH-1048A1000500U	Power Supply		

Other EUT Details

There are two power supplies available for use with both the MAU and the WDU. They are the MEI AH and Oriental Heroe models listed in the **Equipment UnderTest** table.

All transmissions by the keyfob are manually triggered and do not occur at predetermined intervals. All transmissions from the keyfob are less than 5 seconds in duration.

Transmissions by the WDU can be at predetermined intervals (security system integrity transmissions) or are triggered by events that do not occur at predetermined intervals. The system integrity transmissions occur at predetermined intervals of at least one hour and are less than 1 second long and are of two types - a general heartbeat signal that indicates the WDU is operational and a low-battery warning that indicates a possible fault with the system. All other transmissions have a duration of no more than 5 seconds and are triggered by any of the following actions/events: Pressing the panic button; powering the unit on or off; motion sensor detecting movement.

All transmissions are at 418 MHz and use FSK modulation. They all meet the requirements of FCC Part 15.231(a) and RSS 210 section 6.1.1(a).

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EMC Test Data

Client:	LaserShield	Job Number:	J52784
Model:	MAU, WDU and KeyFob	T-Log Number:	T52793
		Account Manager:	Danni Olivas
Contact:	Enter contact name on cover shee		
Emissions Spec:	FCC 15B; 15.231; RSS210	Class:	B
Immunity Spec:	-	Environment:	-

EUT Enclosure

The MAU enclosure is primarily constructed of injection molded plastic. It measures approximately 21 cm wide by 20 cm deep by 6.6 cm high.

The WDU enclosure is primarily constructed of injection molded plastic. It measures approximately 7.6 cm wide by 16.5 cm deep by 19 cm high.

The KeyFob enclosure is primarily constructed of injection molded plastic. It measures approximately 4.5 cm wide by 2.3 cm deep by 6.3 cm high.

Modification History

Mod. #	Test	Date	Modification
1			None made during testing

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

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EMC Test Data

Client:	LaserShield	Job Number:	J52784
Model:	MAU, WDU and KeyFob	T-Log Number:	T52793
		Account Manager:	Danni Olivas
Contact:	Enter contact name on cover shee		
Emissions Spec:	FCC 15B; 15.231; RSS210	Class:	B
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
-		Telephone		
-		Telephone		

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
MAU Phone Out	Telephone	Phone line	Unshielded	3
MAU Line In	Telephone	Phone line	Unshielded	3
MAU DC	AC-DC Adapter	2 wire	Unshielded	
MAU AC-DC Adapter AC	AC outlet			
WDU DC	AC-DC Adapter	2 wire	Unshielded	
WDU AC-DC Adapter AC	AC outlet			

EUT Operation During Emissions

For measurements of emissions from the digital device and the receiver the MAU and WDU were operational (powered on). The WDU was not transmitting during these tests.
For measurements of emissions from the transmitters the WDU and KeyFob were configured to transmit continuously.
For measurements of the timing of the transmissions the WDU and KeyFob were configured to transmit in their intended operational mode.

Client:	LaserShield	Job Number:	J52784
Model:	MAU, WDU and KeyFob	T-Log Number:	T52793
		Account Manager:	Danni Olivas
Contact:	Enter client contact on cover sheet		
Spec:	FCC 15B; 15.231; RSS210	Class:	B

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 9/25/2003
Test Engineer: Mark Briggs
Test Location: SVOATS #2

Config. Used: 1
Config Change: N/A
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was located on the center of the turntable for radiated emissions testing.

The measurement antenna was located 3m from the EUT.

Note, for testing above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

Ambient Conditions:

Temperature: 21 °C
Rel. Humidity: 63 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Fundamental	15.231(a) / RSS 210	Pass	-6.2dB @ 418.000MHz
2	Spurious	15.231(a) / RSS 210	Pass	-20.7dB @ 836.000Unit on its back:
3	Bandwidth	15.231 / RSS 210	Pass	645kHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	LaserShield	Job Number:	J52784
Model:	MAU, WDU and KeyFob	T-Log Number:	T52793
		Account Manager:	Danni Olivas
Contact:	Enter client contact on cover sheet		
Spec:	FCC 15B; 15.231; RSS210	Class:	B

Run #1: Fundamental Field Strength

Frequency	Level	Pol	15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
418.000	74.0	H	80.2	-6.2	Pk	230	1.0	Unit on its back
418.000	72.3	V	80.2	-7.9	Pk	289	1.2	Unit on its side
418.000	71.0	V	80.2	-9.2	Pk	288	1.5	Unit upright
418.000	68.7	H	80.2	-11.5	Pk	180	1.0	Unit on its side
418.000	62.9	H	80.2	-17.3	Pk	214	1.0	Unit upright
418.000	57.8	V	80.2	-22.4	Pk	0	1.0	Unit on its back

Note 1:	All readings are peak readings compared to average limit

Run #2: Field Strength of Spurious Emissions

All readings are peak detector versus average limit

Frequency	Level	Pol	15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Unit on its side:								
1254.000	35.9	V	60.2	-24.3	Pk	0	1.0	Not in a restricted band
836.000	35.7	V	60.2	-24.5	Pk	212	1.0	Not in a restricted band
836.000	34.3	H	60.2	-25.9	Pk	206	1.0	Not in a restricted band
1254.000	32.1	H	60.2	-28.1	Pk	0	1.0	Not in a restricted band
1672.000	25.6	V	54.0	-28.4	Avg	0	1.0	In a restricted band
1672.000	25.4	H	54.0	-28.6	Avg	0	1.0	In a restricted band
1672.000	36.7	V	74.0	-37.3	Pk	0	1.0	In a restricted band
1672.000	36.2	H	74.0	-37.8	Pk	0	1.0	In a restricted band
Unit on its back:								
836.000	39.5	H	60.2	-20.7	Pk	338	1.0	Not in a restricted band
1254.000	35.2	H	60.2	-25.0	Pk	0	1.0	Not in a restricted band
1254.000	34.2	V	60.2	-26.0	Pk	0	1.0	Not in a restricted band
1672.000	26.8	V	54.0	-27.2	Avg	0	1.0	In a restricted band
836.000	32.2	V	60.2	-28.0	PK	256	1.0	Not in a restricted band
1672.000	24.2	H	54.0	-29.8	Avg	0	1.0	In a restricted band
1672.000	38.0	V	74.0	-36.0	Pk	0	1.0	In a restricted band
1672.000	34.5	H	74.0	-39.5	Pk	0	1.0	In a restricted band

Run #2 continued on next page

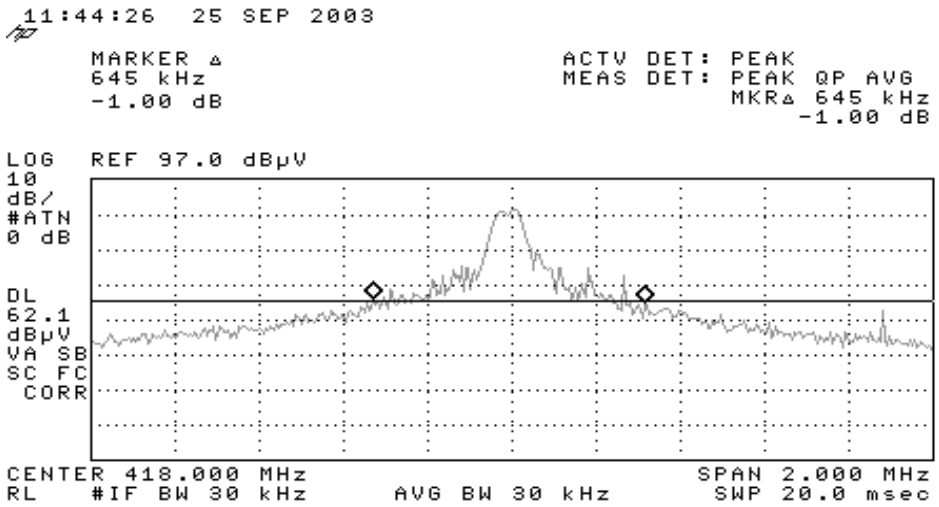
Client:	LaserShield	Job Number:	J52784
Model:	MAU, WDU and KeyFob	T-Log Number:	T52793
		Account Manager:	Danni Olivas
Contact:	Enter client contact on cover sheet		
Spec:	FCC 15B; 15.231; RSS210	Class:	B

Run #2 continued

Frequency	Level	Pol	15.231(a)		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Unit upright:								
1254.000	38.5	V	60.2	-21.7	Pk	0	1.0	Not in a restricted band
1254.000	35.7	H	60.2	-24.5	Pk	0	1.0	Not in a restricted band
836.000	34.7	H	60.2	-25.5	Pk	202	1.0	Not in a restricted band
836.000	34.3	V	60.2	-25.9	Pk	270	1.0	Not in a restricted band
1672.000	26.5	V	54.0	-27.5	Avg	0	1.0	In a restricted band
1672.000	24.8	H	54.0	-29.2	Avg	0	1.0	In a restricted band
1672.000	38.7	V	74.0	-35.3	Pk	0	1.0	In a restricted band
1672.000	34.5	H	74.0	-39.5	Pk	0	1.0	In a restricted band

Note 1:	Average measurements made using a VBW of 1kHz as the device was operating in a pulsed mode
Note 2:	No significant signals observed above the 4th harmonic (1672 MHz).

Run #3: 26dB Bandwidth



Note 1:	The 26dB bandwidth is 645 kHz as shown in the plot above. The maximum permitted is 0.25% of the fundamental frequency (1MHz)

EXHIBIT 3: Test Configuration Photographs

3 Pages

EXHIBIT 4: Theory of Operation
Lasershield Systems, Inc. Model Key Chain Remote (KR)

Uploaded as A Separate Attachment

EXHIBIT 5: Proposed FCC ID Label & Label Location

Uploaded as A Separate Attachment

EXHIBIT 6: Detailed Photographs
Lasershield Systems, Inc. Model Key Chain Remote (KR)

Uploaded as A Separate Attachment

EXHIBIT 7: User's Guide
Lasershield Systems, Inc. Model Key Chain Remote (KR)

Uploaded as A Separate Attachment

EXHIBIT 8: Block Diagram
Lasershield Systems, Inc. Model Key Chain Remote (KR)

Uploaded as A Separate Attachment

EXHIBIT 9: Schematic Diagrams
Lasershield Systems, Inc. Model Key Chain Remote (KR)

Uploaded as A Separate Attachment