

NEMKO Test Report: 1L0698RUS1

Applicant: IDAFAB Engineering
2459 Fawn Creek Lane
Escondido, CA 92026

**Equipment Under Test:
(E.U.T.)** Auto-Eye Personal Anti-Crime Light Remote Control

In Accordance With: **FCC Part 15, Subpart C**
For Low Power Transmitters Operating Periodically
In The Band 40.66 - 40.77 MHz And Above 70 MHz

Tested By: NEMKO Dallas, Inc.
802 N. Kealy
Lewisville, TX 75057-3136

Authorized By: 
David Light, Wireless Lab Supervisor

Date: 5 March 2002

Total Number of Pages: 27

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EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: **1L0698RUS1**

Section 1. Summary of Test Results

Manufacturer: IDAFAB Engineering

Model No.: Auto-Eye Personal Anti-Crime Light Remote Control

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.231. All tests were conducted using measurement procedure ANSI C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST
SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



NVLAP LAB CODE: 100426-0

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This report applies only to the items tested.

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: **1L0698RUS1****Summary Of Test Data**

Name of Test	Paragraph No.	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	Not Applicable
Alternate Field Strength Requirements	15.231(e)	Not Applicable
Powerline Conducted Emissions	15.207	Not Applicable

Footnotes:

1. Frequency Tolerance is not required due to the fact that the device does not operate in the band of 40.66-40.70 MHz
2. Alternate Field Strength Requirements were not needed due to the device's compliance with BW measurements.
3. Powerline Conducted Emissions is not required as this is a battery-operated device.

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Range:	315 MHz
Operating Frequency(ies) of Sample:	315 MHz
Supply Power Requirement:	12V battery
Duty Cycle Correction Factor:	-6.4 dB

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

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Description of E.U.T.

A small key fob transmitter that has three buttons all of which transmit at the same frequency in this case 315 MHz. It can be set up to turn on lights, turn off lights, and to lock/unlock doors. The transmission is pulse based giving it a minor duty cycle adjustment for most measurements in this procedure.

Modifications Incorporated in E.U.T.

Not Applicable

Section 3. Transmission Requirements

NAME OF TEST: Transmission Requirements	PARA. NO.: 15.231(a)
TESTED BY: Lance Walker	DATE: 01/02/2002

Minimum Standard:

15.231(a) Continuous transmissions such as voice, video or data transmissions are not permitted.

15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds after being released.

15.231(a)(2) A transmitter activated automatically shall cease transmission within 5 seconds of activation.

15.231(a)(3) Periodic transmissions at regular pre-determined intervals are not permitted. However polling or supervisory transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

15.231(a)(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm.

Test Results:

Complies

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: **1L0698RUS1**

Rationale for Compliance with Transmission Requirements

15.231(a)(1) 15.231(a)(2) :	<input checked="" type="checkbox"/> Manual activation <input type="checkbox"/> Automatic activation	TX deactivation time:54.9uS
15.231(a)(3) :	<input type="checkbox"/> Regular, predetermined transmissions <input type="checkbox"/> Polling or supervisory transmissions	TX rate and duration: N/A
15.231(a)(4) :	<input type="checkbox"/> Alarm device operating during the pendancy of alarm condition <input type="checkbox"/> Non-alarm device	

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

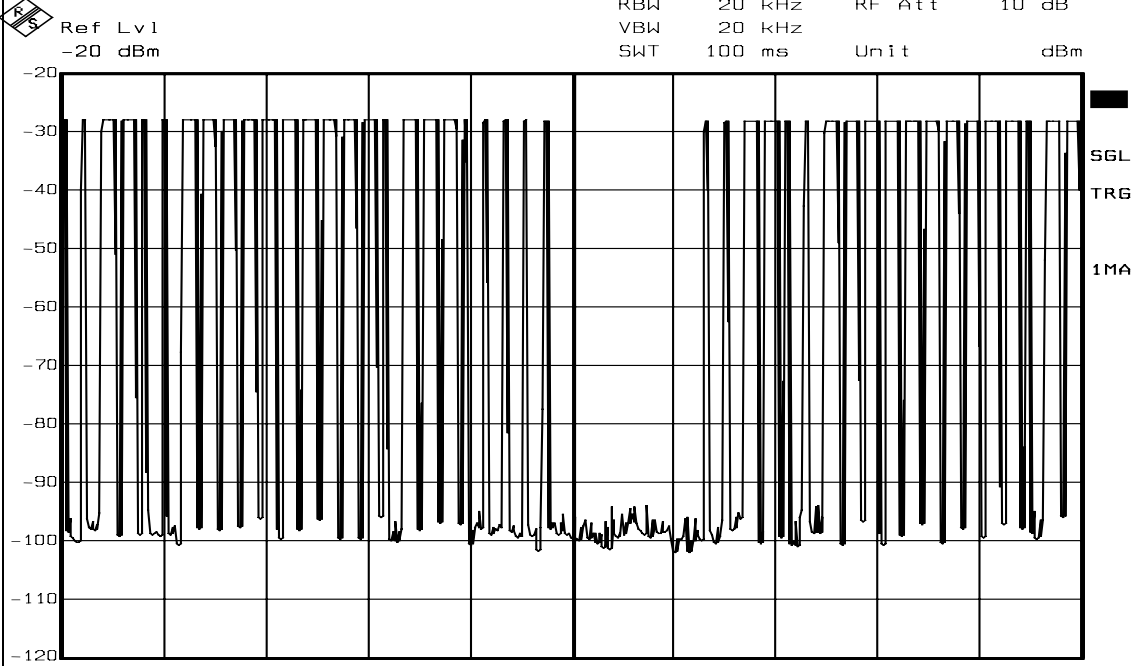
PROJECT NO.: 1L0698RUS1



Dallas Headquarters:

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Lewisville, TX 75057
Tel: (972) 436-9600
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Nemko Dallas, Inc.

Data Plot		Duty Cycle Correction	
Page 1 of 3		Complete <u>X</u>	
Job No.: 1L0698R	Date: 1/1/2002	Preliminary: _____	
Specification:	Temperature(°C): 22		
Tested By: Lance Walker	Relative Humidity(%): 50		
E.U.T.: Key Fob Transmitter			
Configuration: Normal Tx			
Sample Number: S01			
Location: Lab 1	RBW: Refer to plots	Measurement	
Detector Type: Peak	VBW: Refer to plots	Distance: N/A m	
Test Equipment Used			
Antenna: _____	Directional Coupler: _____		
Pre-Amp: _____	Cable #1: 1626		
Filter: _____	Cable #2: _____		
Receiver: 1036	Cable #3: _____		
Attenuator #1: _____	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: 0802			
Measurement Uncertainty: +/-1.7 dB			
			
Center 314.9531485 MHz 10 ms			
Date: 02.JAN.2002 16:13:54			
Notes: 29 broad pulses, 15 narrow pulses			
total pulse time = 47.8 mS			
20log (47.8/100) = -6.4 dB Correction Factor			

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

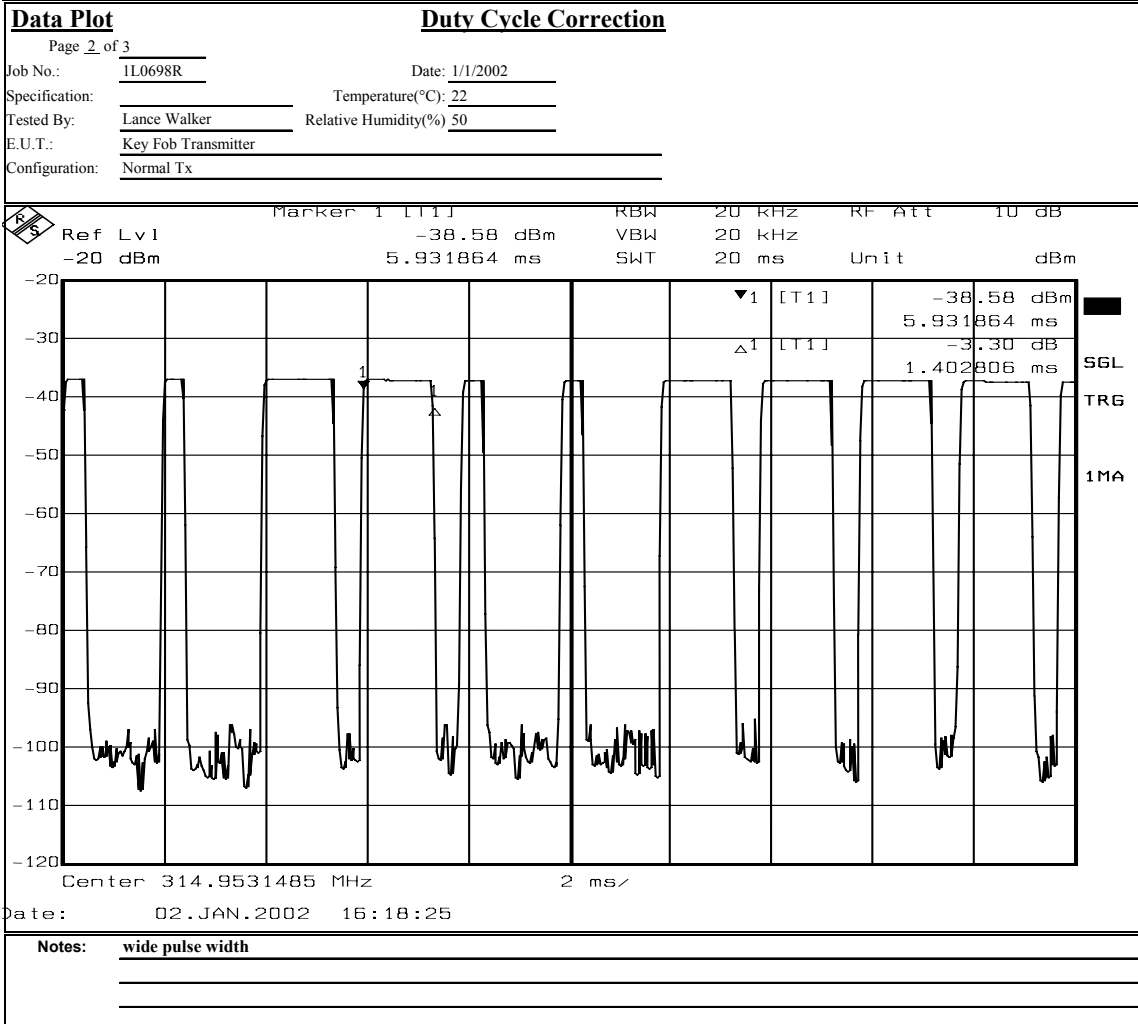
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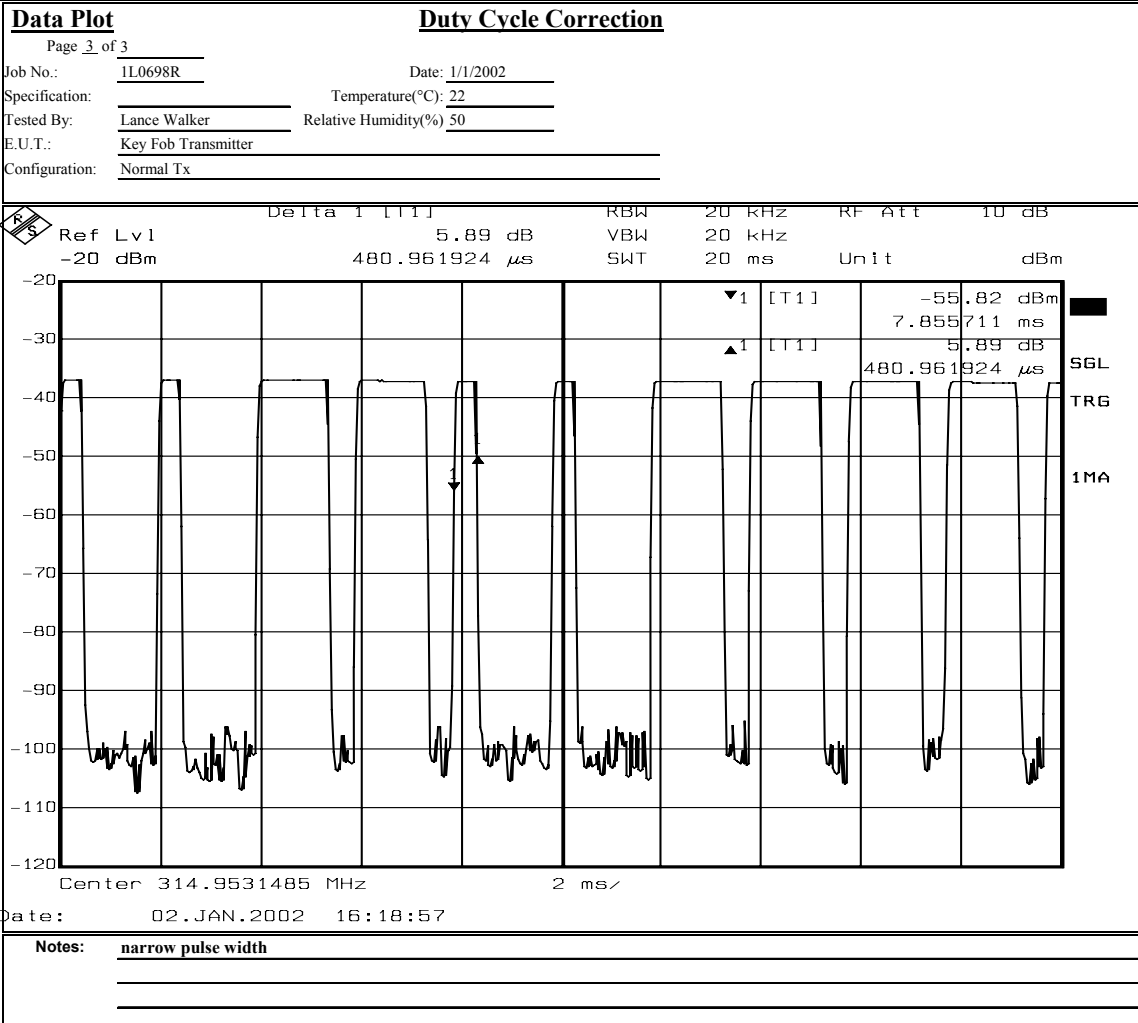
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Data Plot

Release Time

Page 1 of 1

Job No.: 1L0698R

Date: 1/1/2002

Complete XPreliminary:

Specification: CFR 47, Part 15.231

Temperature(°C): 22

Tested By: Lance Walker

Relative Humidity(%) 50

E.U.T.: Key Fob Transmitter

Configuration: Normal Tx

Sample Number: S01

Location: Lab 1

RBW: Refer to plots

Measurement

Detector Type: Peak

VBW: Refer to plots

Distance: N/A m

Test Equipment Used

Antenna: Directional Coupler: Pre-Amp:

Cable #1: 1626

Filter: Cable #2:

Receiver: 1036

Cable #3: Attenuator #1: Cable #4: Attenuator #2: Mixer:

Additional equipment used: 802

Measurement Uncertainty: +/-1.7 dB



Date: 02.JAN.2002 16:37:54

Notes: Release Time 54.9 uS

Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.231(b)
TESTED BY: Lance Walker	DATE: 01/03/2002

Minimum Standard:**Permissible Field Strength Limits (Momentarily Operated Devices)**

Fundamental Frequency (MHz)	Field Strength of Fundamental Microvolts/Meter at 3 meters; (watts)	Field Strength of Unwanted Emissions Microvolts/Meter at 3 meters; (watts)
40.66 - 40.70	2,250	225
70-130	1, 250	125
130-174	1,250 to 3,750*	125 to 375
174-260 (note 1)	3,750	375
260-470 (note 1)	3,750 to 12,500*	375 to 1,250
Above 470	12,500	1,250

Notes:

# Use quasi-peak or averaging meter.	For 130 - 174 MHz: $FS \text{ (microvolts/m)} = (56.82 \times F) - 6136$
* Linear interpolation with frequency F in MHz	For 260 - 470 MHz: $FS \text{ (microvolts/m)} = (41.67 \times F) - 7083$

Any emissions that fall within the restricted bands of 15.205 shall not exceed the following limits:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$ @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

Test Results: Complies

Test Data: See attached table.

Above 1 GHz a spectrum analyzer and low noise amplifier are used to measure emission levels. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was 1 MHz.

In the case of handheld equipment, the E.U.T. is rotated in three planes to obtain worst-case results.

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: 1L0698RUS1

Test Data - Radiated Emissions



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Radiated Emissions Data

Complete	<u>X</u>
Preliminary	<u> </u>

Job #: 1L0698R Test #: 1
Page 1 of 1

Client Name :	IDAFAB
EUT Name :	Key Fob Transmitter
EUT Model # :	
EUT Part # :	
EUT Serial # :	S01
EUT Config. :	Normal Tx

Specification :	FCC Part 15.231		Reference :	
Rod. Ant. #:		Temp. (deg. C) :	Date :	1/3/01
Bicon Ant.#:	1479	Humidity (%) :	Time :	9:30
Log Ant.#:	759	EUT Voltage :	Staff :	WALKER
Bilog Ant.#:		EUT Frequency :	Photo ID:	NA
Dipole Ant.#:		Phase:	Peak Bandwidth:	100 kHz
Cable#:	1983	Location:	Video Bandwidth	100 kHz
Preamp#:	791	Distance:		
Limiter#:	NA			
Atten #:	NA			
Detector#:	1036			

[illegible]

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: 1L0698RUS1



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Radiated Emissions

Page 1 of 1
Job No.: 1L0698R Date: 1/3/02
Specification: FCC 15231 Temperature(°C): 22
Tested By: Lance Walker Relative Humidity(%) 50
E.U.T.: Key Fob Transmitter
Configuration: worst case Tx
Sample Number: S01
Location: AC 3 RBW: 1 MHz
Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna: 1304 Directional Coupler: #N/A
Pre-Amp: 1016 Cable #1: 1046
Filter: #N/A Cable #2: 1484
Receiver: 1464 Cable #3: 1485
Attenuator #1: #N/A Cable #4: #N/A
Attenuator #2: #N/A Mixer: #N/A

Additional equipment used: _____
Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
1.575	47.3	24.3	2.4	32.8	34.8	54	-19.2	H 5th har NF
1.575	47.3	24.3	2.4	32.8	34.8	54	-19.2	V 5th har NF
Notes: 6.4 Duty Cycle Correction factor figured in with function, checked up to 10th har nothing found above 1 GHz. All measurements are PEAK unless otherwise stated.								

Note - The device was tested with a fully charged battery.

Radiated Photographs (Worst Case Configuration)

FRONT VIEW



REAR VIEW



EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: **1L0698RUS1**

Section 5. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.231(c)
TESTED BY: Lance Walker	DATE: 01/02/2002

Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: Complies

Test Data: See attached graph.

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

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Nemko Dallas, Inc.

Data Plot

20 dB BW

Page 1 of 1

Job No.: 1L0698R

Date: 1/2/2002

Complete X
Preliminary: _____

Specification: CFR 47, Part 15.231

Temperature(°C): 22

Tested By: Lance Walker

Relative Humidity(%) 50

E.U.T.: Key Fob Transmitter

Configuration: Normal Tx Max Hold

Sample Number: S01

Location: Lab 1

RBW: Refer to plots

Measurement

Detector Type: Peak

VBW: Refer to plots

Distance: N/A m

Test Equipment Used

Antenna: _____

Directional Coupler: _____

Pre-Amp: _____

Cable #1: 1626

Filter: _____

Cable #2: _____

Receiver: 1036

Cable #3: _____

Attenuator #1: _____

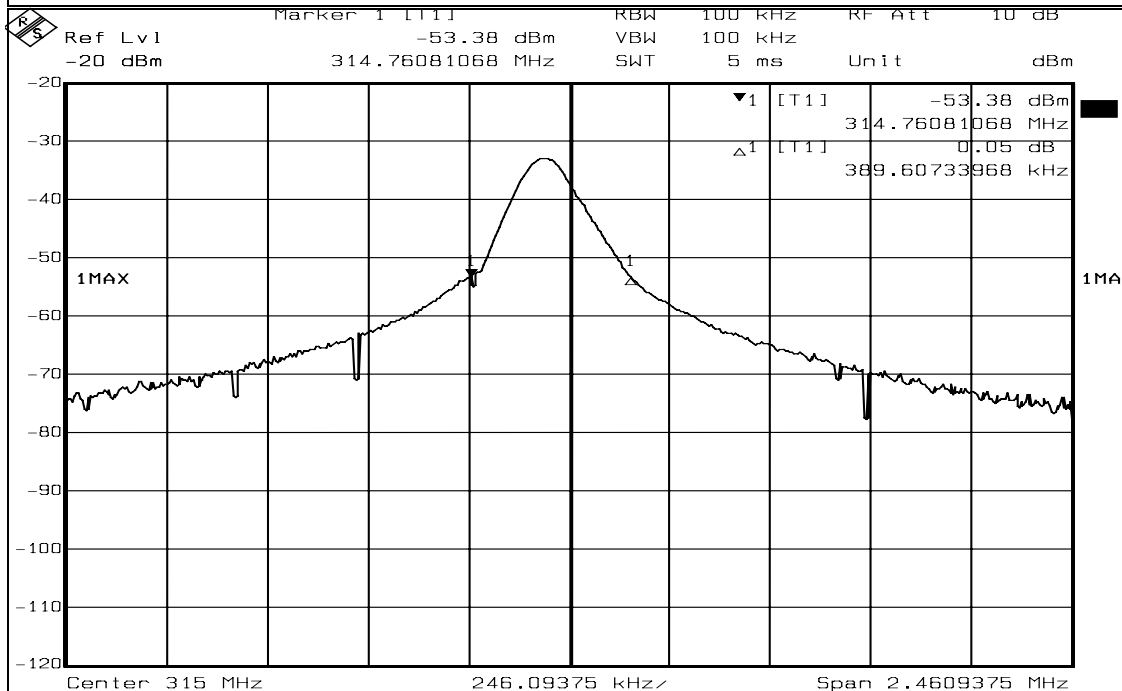
Cable #4: _____

Attenuator #2: _____

Mixer: _____

Additional equipment used: 802

Measurement Uncertainty: +/-1.7 dB



Date: 02.JAN.2002 16:06:33

Notes: 20 dB BW

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: 1L0698RUS1

**Section 6. Frequency Tolerance
Devices in the Frequency Band 40.66 - 40.77 MHz**

NAME OF TEST: Frequency Tolerance	PARA. NO.: 15.231(d)
TESTED BY:	DATE:

Minimum Standard: 15.231(d) For devices operating in the frequency band 40.66 - 40.77 MHz, the bandwidth of the emission shall be confined with sideband edges and the frequency tolerance of the carrier shall be $\pm 0.01\%$. This frequency tolerance shall be maintained for a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary power supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Results: Complies/Does Not Comply. See attached graph and data.

Test Data: See attached graph.

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: 1L0698RUS1

Section 7. Periodic Alternate Field Strength Requirements

NAME OF TEST: Periodic Alternate Field Strength Requirements PARA. NO.: 15.231(e)

TESTED BY:

DATE:

Minimum Standard:

15.231(e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation including operation prohibited in paragraph (a) of this section provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section except the field strength table in paragraph (b) of this section is replaced by the following.

Not Applicable

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	1,000	100
70 - 130	500	50
130 - 174	500 to 1,500	50 to 150
174 - 260	1,500	150
260-470	1,500 to 5,000	150 to 500
Above 470	5,000	500

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Test Results:

Complies/Does Not Comply.

Test Data:

See attached table.

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: 1L0698RUS1

Section 8. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY:	DATE:

Minimum Standard:

Frequency(MHz)	Maximum Powerline Conducted RF Voltage	
	μV	μV
0.45 - 30.0	250	80

Test Results:

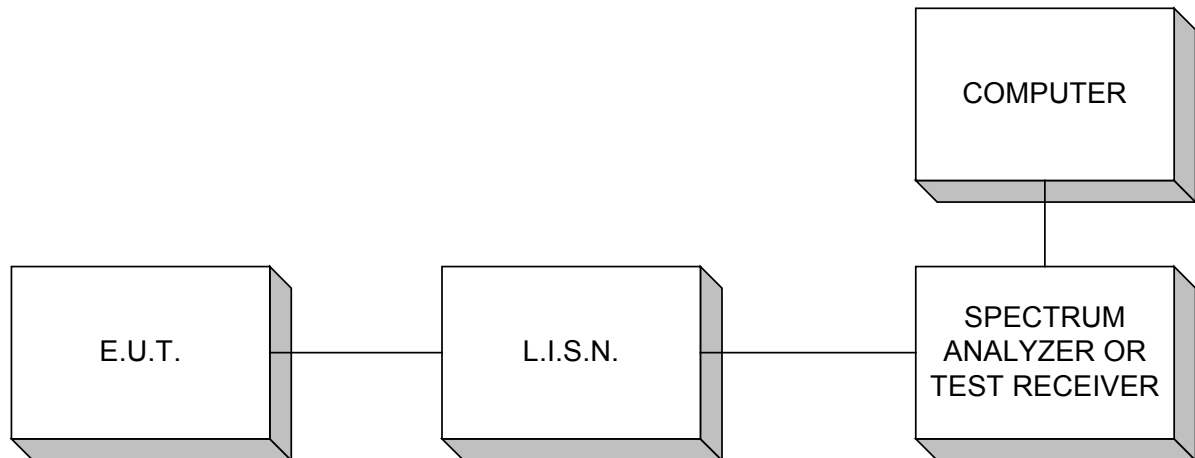
Complies. See attached graphs and table.

Test Data:

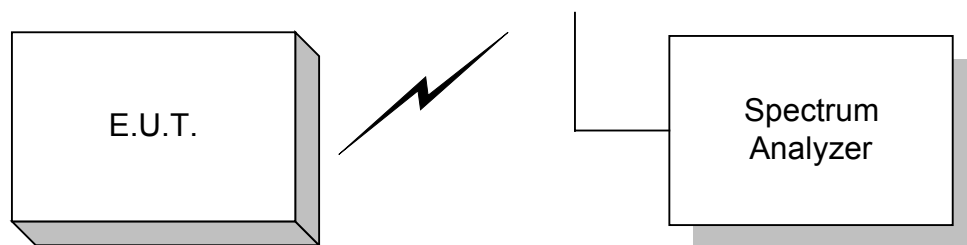
See attached graphs and table.

Section 9. Block Diagrams

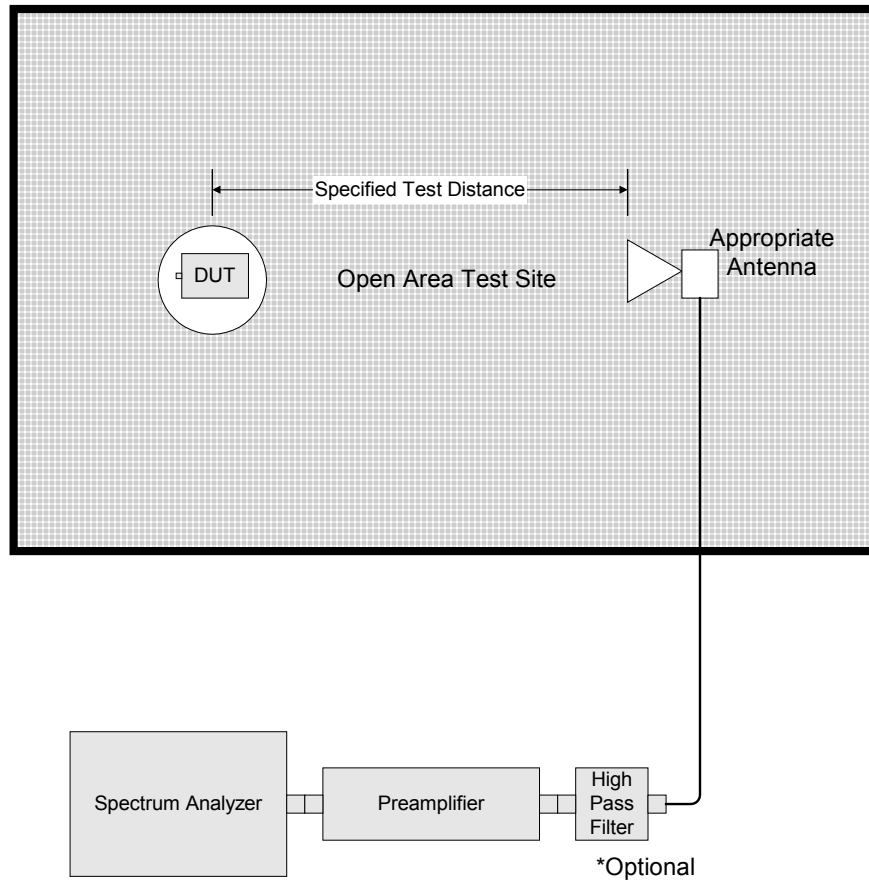
Conducted Emissions



Occupied Bandwidth, Duty Cycle

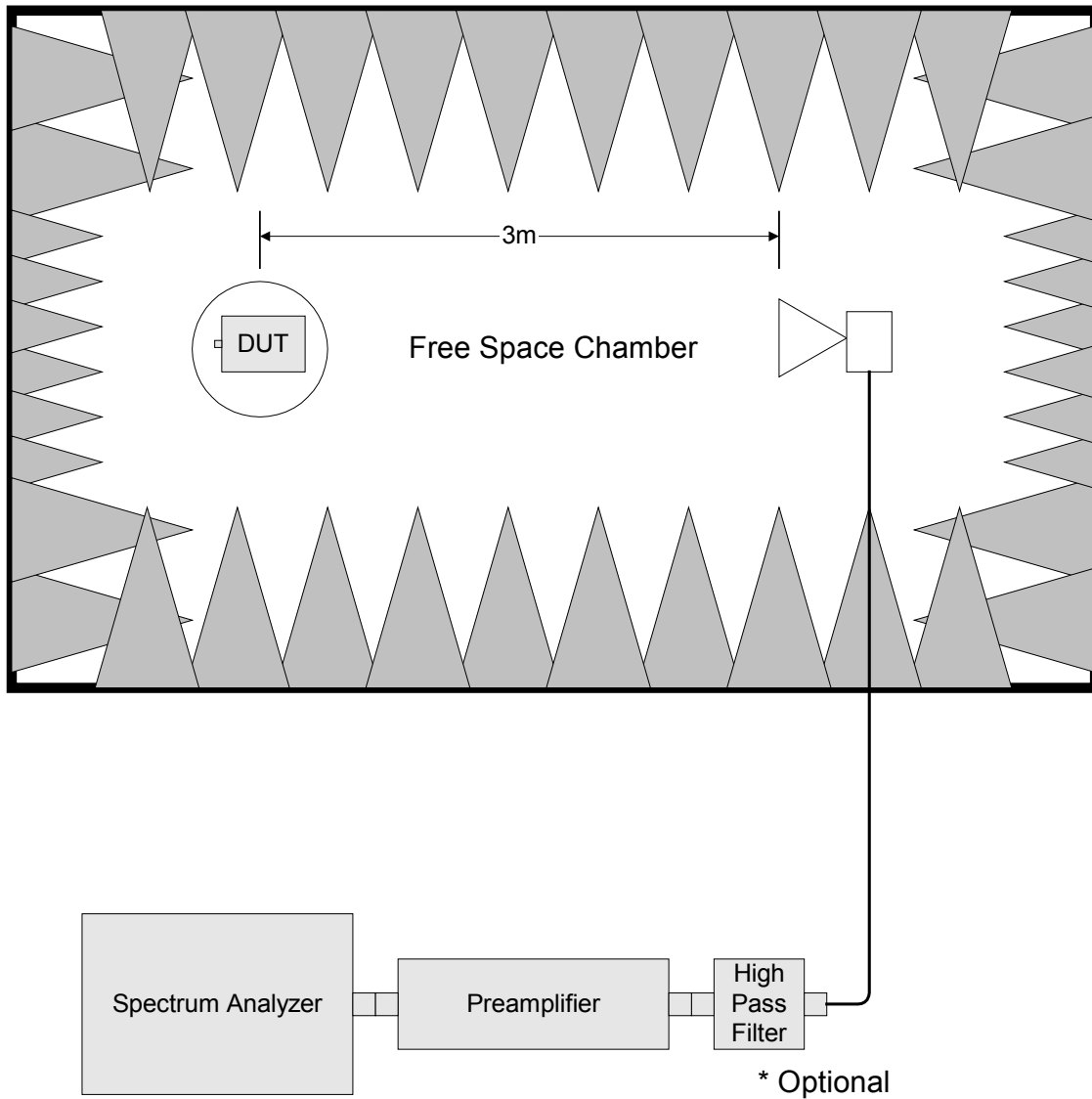


Outdoor Test Site For Radiated Emissions



Radiated Emissions 30 MHz - 1 GHz

The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.



Radiated Emissions above 1 GHz

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

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Section 10. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01
1626	CABLE, 5 ft	MEGAPHASE 10311 1GVT4	N/A	CBU
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	07/30/01
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/30/01
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/02/01
1046	Flex cable 1m	Astrolab Inc. 32022-2-29094K-1M	N/A	01/29/01
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	06/01/01
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	06/01/01
1479	Bi Conical Antenna 20-330 Mhz	A. H. Systems SAS-200/540	496	03/31/01
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	02/01/01
1983	CABLE	KTL Site A OATS	N/A	09/25/01
791	PREAMP, 25dB	ICC LNA25	398	08/16/01

Nemko Dallas, Inc.

FCC PART 15, SUBPART C

POWER TRANSMITTERS

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: **1L0698RUS1**

ANNEX A - RESTRICTED BANDS

EQUIPMENT: Auto-Eye Personal Anti-Crime Light Remote Control

PROJECT NO.: **1L0698RUS1****Annex A Restricted Bands of Operation**

(a) Except as shown in paragraph (d) of this section , only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.15
0.49 - 0.51	16.69475-16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425-16.80475	960-1240	7.25-7.75
3.020 - 3.026	25.5-25.67	1300-1427	8.025-8.5
4.125 - 4.128	37.5-38.25	1435-1626.6	9.0-9.2
4.17725 - 4.17775	73-74.6	1645.5-1646.5	9.3-9.5
4.20725 - 4.20775	74.8-75.2	1660-1710	10.6-12.7
6.215 - 6.218	108-121.94	1718.8-1722.2	13.25-13.4
6.31175 - 6.31225	123-138	2220-2300	14.47-14.5
8.291 - 8.294	149.9-150.05	2310-2390	15.35-16.2
8.362 - 8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625 - 8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425 - 8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29 - 12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975 - 12.52025	240-285	3345.8-3358	36.43-36.5
12.57675 - 12.57725	322-335.4	3600-4400	Above 38.6
13.36 - 13.41			