CKC LABORATORIES, INC. Testing the Future

ACCREDITED
Certicate Numbers
803.01 - 803.06
EMC/SAFETY

ADDENDUM TO FC03-010

FOR THE

SELF CONTAINED DOOR LOCK, LS2 & LS2P

FCC PART 15 SUBPART C SECTION 15.209
& SUBPART B SECTION 15.109 CLASS B

COMPLIANCE

DATE OF ISSUE: FEBRUARY 10, 2003

PREPARED FOR:

International Electronics, Inc.
427 Turnpike Street
Canton, MA 02021

P.O. No.: 20587
W.O. No.: 80096

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: January 23, 2003

Report No.: FC03-010A

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	January 23, 2003
DATE OF RECEIPT:	January 23, 2003
PURPOSE OF TEST:	To demonstrate the compliance of the Self Contained Door Lock, LS2 & LS2P with the requirements for FCC Part 15 Subpart C Section 15.209 and Subpart B Section 15.109 Class B devices. **Addendum A** is to revise the test equipment list for radiated emissions.
TEST METHOD:	ANSI C63.4 (1992)
MANUFACTURER:	International Electronics, Inc. 427 Turnpike Street Canton, MA 02021
REPRESENTATIVE:	Chris Hentschel
TEST LOCATION:	CKC Laboratories, Inc. 5473A Clouds Rest Mariposa, CA 95338

SUMMARY OF RESULTS

As received, the International Electronics, Inc. Self Contained Door Lock, LS2 & LS2P was found to be fully compliant with the following standards and specifications:

United States

- FCC Part 15 Subpart B Section 15.109 Class B
- FCC Part 15 Subpart C Section 15.209
- ANSI C63.4 (1992) method

Canada

RSS-210 using:

- FCC Part 15 Subpart B Section 15.109 Class B
- FCC Part 15 Subpart C Section 15.209
- ANSI C63.4 (1992) method

Industry of Canada File No. IC 3082-B

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply. Conducted emissions not required for this device.

APPROVALS

QUALITY ASSURANCE:

Steve Behm, Director of Engineering Services and Quality Assurance

Joyce Walker, Quality Assurance Administrative Manager

Chuck Kendall, Lab Manager

TEST PERSONNEL:

Monika Brandle, EMC Test Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION
The Self Contained Door Lock, LS2 & LS2P tested by CKC Laboratories was a production unit.

15.31(e) Voltage Variations
New batteries were used and no further testing was required because it is battery powered.

15.31(m) Number Of Channels
This device operates on a single channel.

15.33(a) Frequency Ranges Tested
15.109 Radiated Emissions: 30 MHz – 1000 MHz
15.209 Radiated: 9 kHz – 1000 MHz

FCC SECTION 15.35: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz

15.203 Antenna Requirements
The antenna is an integral part of the EUT and is non-removable; therefore the EUT complies with Section 15.203 of the FCC rules.

15.205 Restricted Bands
The fundamental operating frequency lies outside the restricted bands and therefore complies with the requirements of Section 15.205 of the FCC rules. Any spurious emission coming from the EUT was investigated to determine if any portion lies inside the restricted band. If any portion of a spurious emissions signal was found to be within a restricted band, investigation was performed to ensure compliance with Section 15.209.

Eut Operating Frequency
The EUT was operating at 125 kHz.

Temperature And Humidity During Testing
The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

EQUIPMENT UNDER TEST

Self Contained Door Lock

Manuf: International Electronics, Inc.
Model: LS2 & LS2P
Serial: 012303-001
FCC ID: PHU (pending)

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the Self Contained Door Lock, LS2 & LS2P. All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: 15.209 Fundamental Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	Corr dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
0.125	55.1	10.7		0.0	-80.0	-14.2	25.6	-39.8	H

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization

COMMENTS: The keypad with electronics is used in an integrated door lock assembly. The unit consists of a frame, keys, silicone rubber boot, circuit board and electronics. The keypad assembly on the outside of the door is coated for weather resistance. The control electronics and batteries are mounted on the interior side of the door. The keypad housing allows for an optional RFID reader and antenna. The LS2 and LS2P are contained in the same enclosure. The only difference is that if the customer wants to pay extra they can activate the transceiver portion of the device. For purposes of testing, the device has the transmitter portion active and is continuously transmitting at 125 kHz. Operating Voltage: 6VDC. Other Clock Frequencies: 7.3728 MHz. Frequency Range Investigated: Fundamental Emissions.

Table 2: 15.209 Six Highest Radiated Emission Levels

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
36.664	37.9	11.2	-26.8	0.8		23.1	40.0	-16.9	H
36.864	23.3	11.1	-26.8	0.8		8.4	40.0	-31.6	V
44.037	28.9	10.8	-26.8	0.9		13.8	40.0	-26.2	H
44.237	24.7	10.8	-26.8	0.9		9.6	40.0	-30.4	V
51.410	28.8	10.3	-26.8	1.0		13.3	40.0	-26.7	H
58.982	28.5	9.6	-26.8	1.1		12.4	40.0	-27.6	V

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: The keypad with electronics is used in an integrated door lock assembly. The unit consists of a frame, keys, silicone rubber boot, circuit board and electronics. The keypad assembly on the outside of the door is coated for weather resistance. The control electronics and batteries are mounted on the interior side of the door. The keypad housing allows for an optional RFID reader and antenna. The LS2 and LS2P are contained in the same enclosure. The only difference is that if the customer wants to pay extra they can activate the transceiver portion of the device. For purposes of testing, the device has the transmitter portion active and is continuously transmitting at 125 kHz. Operating Voltage: 6VDC. Other Clock Frequencies: 7.3728 MHz. Frequency Range Investigated: 9 kHz – 1000 MHz. No spurious emissions found within 20dB of limit. **Recorded noise floor readings**.

Table 3: 15.109 Six Highest Radiated Emission Levels

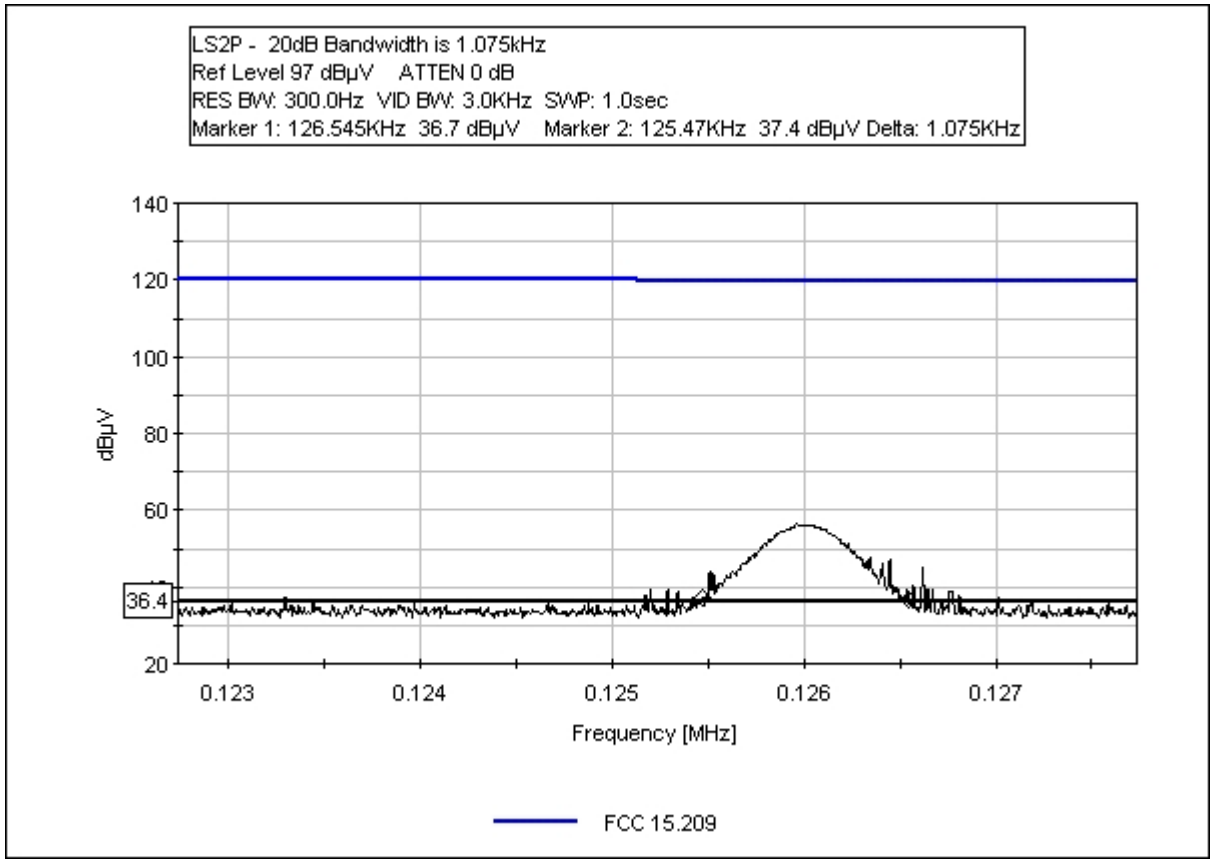
FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp dB	Cable dB	dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
36.664	37.9	11.2	-26.8	0.8		23.1	40.0	-16.9	H
36.864	23.3	11.1	-26.8	0.8		8.4	40.0	-31.6	V
44.037	28.9	10.8	-26.8	0.9		13.8	40.0	-26.2	H
44.237	24.7	10.8	-26.8	0.9		9.6	40.0	-30.4	V
51.410	28.8	10.3	-26.8	1.0		13.3	40.0	-26.7	H
58.982	28.5	9.6	-26.8	1.1		12.4	40.0	-27.6	V

Test Method: ANSI C63.4 (1992)
Spec Limit: FCC Part 15 Subpart B Section 15.109 Class B
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: The keypad with electronics is used in an integrated door lock assembly. The unit consists of a frame, keys, silicone rubber boot, circuit board and electronics. The keypad assembly on the outside of the door is coated for weather resistance. The control electronics and batteries are mounted on the interior side of the door. The keypad housing allows for an optional RFID reader and antenna. The LS2 and LS2P are contained in the same enclosure. The only difference is that if the customer wants to pay extra they can activate the transceiver portion of the device. For purposes of testing, the device has the transmitter portion active and is continuously transmitting at 125 kHz. Operating Voltage: 6VDC. Other Clock Frequencies: 7.3728 MHz. Frequency Range Investigated: 30 MHz – 1000 MHz. No spurious emissions found within 20dB of limit. Recorded noise floor readings.

20 dB BANDWIDTH PLOT



MEASUREMENT UNCERTAINTY

TEST	HIGHEST UNCERTAINTY
Radiated Emissions	+/- 2.94 dB

Note: Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Statements of compliance are based on the nominal values only.

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The radiated emissions data of the Self Contained Door Lock, LS2 & LS2P, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect both the radiated emissions data. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBµV, and a vertical scale of 10 dB per division.

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

EUT TESTING

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. The frequency range of 30 MHz to 88 MHz was scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. The frequency range of 100 to 300 MHz was then scanned in the same manner using the biconical antenna and the peaks recorded. Lastly, a scan of the FM band from 88 to 110 MHz was made, using a reduced resolution bandwidth and frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 to 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 to 1000 MHz was again scanned. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation, antenna height, and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor.

APPENDIX A

TEST SETUP PHOTOGRAPHS

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View

APPENDIX B

TEST EQUIPMENT LIST

Radiated Emissions 9kHz-1000MHz

Description	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Spectrum Analyzer RF Section	HP	8568B	2235A02425	00092	10/23/02	10/23/03
Spectrum Analyzer Display	HP	8568B	2237A04323	00091	10/23/02	10/23/03
Spectrum Analyzer QP Adapter	HP	85650A	2521A00904	02495	3/4/02	3/4/03
Antenna, Bicon	A&H	SAS-200/542	156	00225	12/2/02	12/2/03
Antenna, Log Periodic	A&H	SAS-200/510	154	01330	6/19/02	6/19/03
Preamp	HP	8447D	1937A02604	00099	3/21/02	3/21/03
Mag Loop	EMCO	6502	01074	00226	5/31/02	5/31/03

Fundamental, Power Output, Occupied Bandwidth (99% Bandwidth)

Description	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Spectrum Analyzer RF Section	HP	8568B	2235A02425	00092	10/23/02	10/23/03
Spectrum Analyzer Display	HP	8568B	2237A04323	00091	10/23/02	10/23/03
Spectrum Analyzer QP Adapter	HP	85650A	2521A00904	02495	3/4/02	3/4/03
Mag Loop	EMCO	6502	01074	00226	5/31/02	5/31/03

APPENDIX C: MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories Inc. •5473A Clouds Rest • Mariposa CA 95338 • 1 800 500 4EMC (4362)

Customer: **International Electronics, Inc.**
Specification: **FCC 15.209**
Work Order #: **80096** Date: 01/23/2003
Test Type: **Maximized Emissions** Time: 14:49:55
Equipment: **Self Contained Door Lock** Sequence#: 1
Manufacturer: International Electronics, Inc. Tested By: Monika Brandle
Model: LS2 & LS2P
S/N: 012303-001

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Self Contained Door Lock*	International Electronics, Inc.	LS2 & LS2P	012303-001

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

The keypad with electronics is used in an integrated door lock assembly. The unit consists of a frame, keys, silicone rubber boot, circuit board and electronics. The keypad assembly on the outside of the door is coated for weather resistance. The control electronics and batteries are mounted on the interior side of the door. The keypad housing allows for an optional RFID reader and antenna. The LS2 and LS2P are contained in the same enclosure. The only difference is that if the customer wants to pay extra they can activate the transceiver portion of the device. For purposes of testing, the device has the transmitter portion active and is continuously transmitting at 125 kHz. Operating Voltage: 6VDC. Other Clock Frequencies: 7.3728 MHz. Frequency Range Investigated: Fundamental and Harmonic Emissions.

Transducer Legend:

T1=Loop 1074 T2=Cable - 10 Meter
T3=15.31 3m 40dB/Dec Correction

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	125.165k	55.1	+10.7	+0.0	-80.0		+0.0	-14.2	25.6	-39.8	Horiz
2	375.290k	23.2	+10.7	+0.1	-80.0		+0.0	-46.0	16.1	-62.1	Horiz

Test Location: CKC Laboratories Inc. •5473A Clouds Rest • Mariposa CA 95338 • 1 800 500 4EMC (4362)

Customer: **International Electronics, Inc.**
Specification: **FCC 15.209**
Work Order #: **80096** Date: 01/23/2003
Test Type: **Maximized Emissions** Time: 10:57:12
Equipment: **Self Contained Door Lock** Sequence#: 2
Manufacturer: International Electronics, Inc. Tested By: Monika Brandle
Model: LS2 & LS2P
S/N: 012303-001

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Self Contained Door Lock*	International Electronics, Inc.	LS2 & LS2P	012303-001

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

The keypad with electronics is used in an integrated door lock assembly. The unit consists of a frame, keys, silicone rubber boot, circuit board and electronics. The keypad assembly on the outside of the door is coated for weather resistance. The control electronics and batteries are mounted on the interior side of the door. The keypad housing allows for an optional RFID reader and antenna. The LS2 and LS2P are contained in the same enclosure. The only difference is that if the customer wants to pay extra they can activate the transceiver portion of the device. For purposes of testing, the device has the transmitter portion active and is continuously transmitting at 125 kHz. Operating Voltage: 6VDC. Other Clock Frequencies: 7.3728MHz. Frequency Range Investigated: 9 kHz – 1000 MHz. No spurious emissions found within 20dB of limit. Recorded noise floor readings.

Transducer Legend:

T1=Amp - S/N 604 T2=Bicon 156
T3=Cable - 10 Meter

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	36.664M	37.9	-26.8	+11.2	+0.8		+0.0	23.1	40.0	-16.9	Horiz
2	44.037M	28.9	-26.8	+10.8	+0.9		+0.0	13.8	40.0	-26.2	Horiz
3	51.410M	28.8	-26.8	+10.3	+1.0		+0.0	13.3	40.0	-26.7	Horiz
4	58.982M	28.5	-26.8	+9.6	+1.1		+0.0	12.4	40.0	-27.6	Vert
5	44.237M	24.7	-26.8	+10.8	+0.9		+0.0	9.6	40.0	-30.4	Vert
6	36.864M	23.3	-26.8	+11.1	+0.8		+0.0	8.4	40.0	-31.6	Vert

Test Location: CKC Laboratories Inc. •5473A Clouds Rest • Mariposa CA 95338 • 1 800 500 4EMC (4362)

Customer: **International Electronics, Inc.**
Specification: **15.109 CLASS B**
Work Order #: **80096** Date: 01/23/2003
Test Type: **Maximized Emissions** Time: 10:57:12
Equipment: **Self Contained Door Lock** Sequence#: 2
Manufacturer: International Electronics, Inc. Tested By: Monika Brandle
Model: LS2 & LS2P
S/N: 012303-001

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Self Contained Door Lock*	International Electronics, Inc.	LS2 & LS2P	012303-001

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

The keypad with electronics is used in an integrated door lock assembly. The unit consists of a frame, keys, silicone rubber boot, circuit board and electronics. The keypad assembly on the outside of the door is coated for weather resistance. The control electronics and batteries are mounted on the interior side of the door. The keypad housing allows for an optional RFID reader and antenna. The LS2 and LS2P are contained in the same enclosure. The only difference is that if the customer wants to pay extra they can activate the transceiver portion of the device. For purposes of testing, the device has the transmitter portion active and is continuously transmitting at 125 kHz. Operating Voltage: 6VDC. Other Clock Frequencies: 7.3728 MHz. Frequency Range Investigated: 30 MHz – 1000 MHz. No spurious emissions found within 20dB of limit. Recorded noise floor readings.

Transducer Legend:

T1=Amp - S/N 604 T2=Bicon 156
T3=Cable - 10 Meter

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	36.664M	37.9	-26.8	+11.2	+0.8		+0.0	23.1	40.0	-16.9	Horiz
2	44.037M	28.9	-26.8	+10.8	+0.9		+0.0	13.8	40.0	-26.2	Horiz
3	51.410M	28.8	-26.8	+10.3	+1.0		+0.0	13.3	40.0	-26.7	Horiz
4	58.982M	28.5	-26.8	+9.6	+1.1		+0.0	12.4	40.0	-27.6	Vert
5	44.237M	24.7	-26.8	+10.8	+0.9		+0.0	9.6	40.0	-30.4	Vert
6	36.864M	23.3	-26.8	+11.1	+0.8		+0.0	8.4	40.0	-31.6	Vert