

TEST RESULT SUMMARY

FCC Part 15 Subpart C Section 15.231 Industry Canada RSS-210 Issue 7 Section A1.1

MANUFACTURER'S NAME	Larco
MANUFACTURER'S ADDRESS	1902 13th Street SE Brainerd MN 56401
NAME OF EQUIPMENT	MDT1
MODEL NUMBER(S) TESTED	336857
TEST REPORT NUMBER	WC800980
TEST DATE(S)	06 February 2008

The device under test was modified so that the transmitter remains on continuously for the purpose of measuring transmitter characteristics.

TÜV SÜD America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable portions of the electromagnetic compatibility requirements of FCC Part 15 Subpart C Section 15.231 "Periodic operation in the band 40.66–40.70 MHz and above 70 MHz" and Industry Canada RSS-210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"

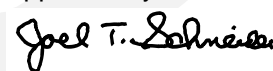
It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

Date: 21 February 2008

Tested by:



Approved by:



Location: Taylors Falls MN
USA

Greg Jakubowski
Senior EMC Technician

Not Transferable

Joel T Schneider
Senior EMC Engineer

EMC TEST REPORT

Test Report No. WC800980 Date of issue: 21 February 2008

Model / Serial No(s) Tested 336857 / ---

Product Type MDT1

Manufacturer Larco

Address 1902 13th Street SE
Brainerd MN 56401

Test Result ☒ **Positive** ☐ **Negative**

Total pages including Appendices 32

TÜV SÜD America Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV SÜD America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America Inc issued reports.

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TÜV SÜD America Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NARTE, and VCCI.

REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	32	21 February 2008	Initial Release



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STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are accurate. The reader is cautioned that there is some measurement variability due to the tolerances of the test equipment that can contribute to a nominal product measurement uncertainty. Furthermore, component differences and manufacturing process variability of production units similar to that tested may result in additional product uncertainty. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests.

TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

EMC TEST REGULATIONS:

The tests were performed according to the following regulations:

FCC Part 15 Subpart C Section 15.231
IC RSS-210 Issue 7

ENVIRONMENTAL CONDITIONS IN THE LAB

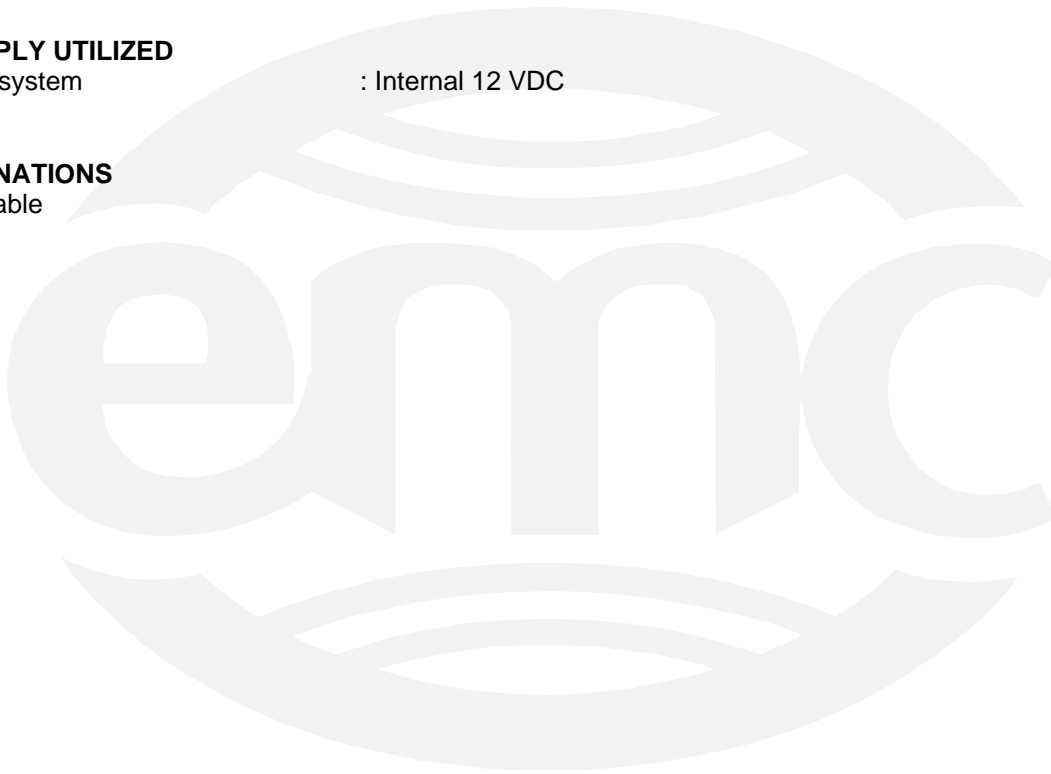
	<u>Actual</u>
Temperature:	: 23 °C
Relative Humidity	: 22 %
Atmospheric pressure	: 99.0 kPa

POWER SUPPLY UTILIZED

Power supply system : Internal 12 VDC

SIGN EXPLANATIONS

- ☐ - not applicable
- ☒ - applicable



Momentary operation

FCC 15.231(a), RSS-210 A1.1.1

Manufacturer's declaration

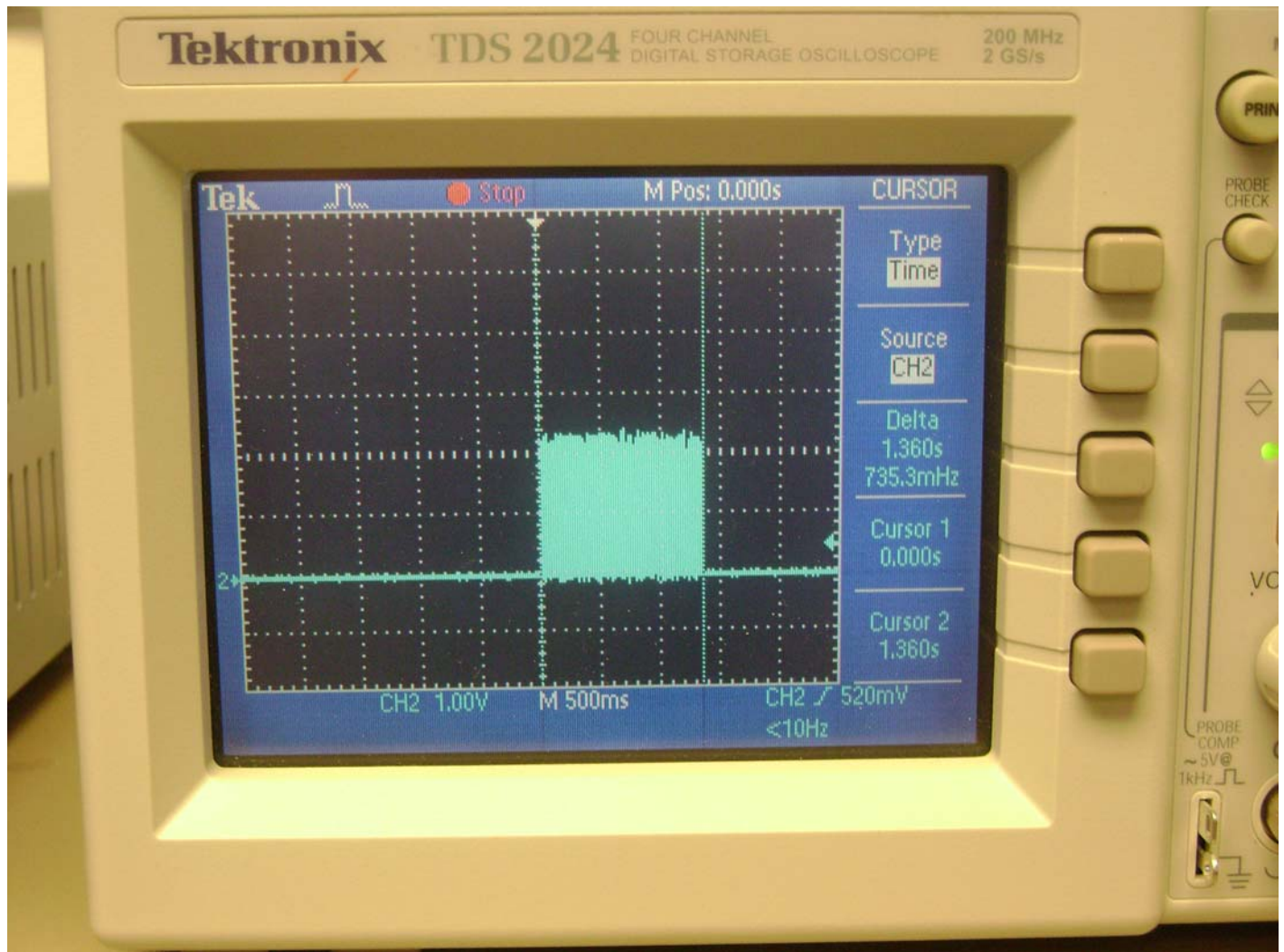
The requirements are: ☒ - MET ☐ - NOT MET

The transmitter is activated automatically.

Once activated, packets are sent for a maximum of 2 seconds

The transmitter does not transmit at regular predetermined intervals

Manufacturer's data



Radiated emissions - fundamental

FCC 15.231(b), RSS-210 A1.1.2

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Fundamental transmit frequency = 433.978 MHz

Maximum field strength = 838 $\mu\text{V/m}$ or 58.46 dB $\mu\text{V/m}$ at 3 meters

Minimum margin of compliance = 22.3 dB

Test location

☒ - Wild River Lab Large Test Site (Open Area Test Site)

☐ - Wild River Lab Small Test Site (Open Area Test Site)

Test distance

☒ - 3 meters

☐ - 10 meters

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
3202	EM-6917B	Electro-Metrics	Biconicallog Periodic	101	10-May-08
3847	ZHL-1042J	Mini-Circuits	Preamplifier 10 - 3000 MHz	0607	Code B
3294	8566B	Hewlett-Packard	Spectrum Analyzer	2349A03098	16-May-08
3295	85662A	Hewlett-Packard	Analyzer Display	2349A06144	16-May-08
3800	ESCS 30	Rohde & Schwarz	EMI Receiver	100312	20-Jul-08

Code B = Calibration verification performed internally. Code Y = Calibration not required when used with other calibrated equipment

Test limit

10996 $\mu\text{V/m}$ or 80.8 dB $\mu\text{V/m}$ at 3 meters

Test data

See following pages

RADIATED EMISSIONS



Test Report #: WC800980 Run 1 Test Area: LTS

EUT Model #: 336857 Date: 2/4/2008

EUT Serial #: n/a EUT Power: 12VDC battery Temperature: 21.0 °C

Test Method: FCC 15.231, IC RSS-210 Air Pressure: 98.0 kPa

Customer: Larco Rel. Humidity: 21.0 %

EUT Description: 433 MHz Transmitter, Magnetic Door Sensor

Notes: _____

Data File Name: 0980.dat

Page: 1 of 2

List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 15.231 433.92 MHz Fc	DELTA2 15.231 433.92 MHz Fc Pk
All measurments maximized						
EUT upright, LED up and facing measurement antenna at 0 degrees azimuth						
433.978 MHz	77.25 Pk	2.14 / 16.42 / 29.85 / 0.0	65.96	V / 1.10 / 68	n/a	-34.84
433.978 MHz	69.75 Av	2.14 / 16.42 / 29.85 / 0.0	58.46	V / 1.10 / 68	-22.34	n/a
EUT on narrow side						
433.938 MHz	76.85 Pk	2.14 / 16.42 / 29.85 / 0.0	65.56	V / 1.00 / 65	n/a	-35.24
433.938 MHz	69.35 Av	2.14 / 16.42 / 29.85 / 0.0	58.06	V / 1.00 / 65	-22.74	n/a
EUT on it's back						
433.949 MHz	77.2 Pk	2.14 / 16.42 / 29.85 / 0.0	65.91	H / 1.00 / 238	n/a	-34.89
433.949 MHz	69.7 Av	2.14 / 16.42 / 29.85 / 0.0	58.41	H / 1.00 / 238	-22.39	n/a

Tested by: Greg Jakubowski

Printed

Signature

Reviewed by: J. T. Schneider

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Signature

RADIATED EMISSIONS



Test Report #: WC800980 Run 1 Test Area: LTS

EUT Model #: 336857 Date: 2/4/2008

EUT Serial #: n/a EUT Power: 12VDC battery Temperature: 21.0 °C

Test Method: FCC 15.231, IC RSS-210 Air Pressure: 98.0 kPa

Customer: Larco Rel. Humidity: 21.0 %

EUT Description: 433 MHz Transmitter, Magnetic Door Sensor

Notes: _____

Data File Name: 0980.dat

Page: 2 of 2

Measurement summary for limit1: 15.231 433.92 MHz Fc (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 15.231 433.92 MHz Fc
433.978 MHz	69.75 Av	2.14 / 16.42 / 29.85 / 0.0	58.46	V / 1.10 / 68	-22.34

Measurement summary for limit2: 15.231 433.92 MHz Fc Pk (Pk)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 15.231 433.92 MHz Fc Pk
433.978 MHz	77.25 Pk	2.14 / 16.42 / 29.85 / 0.0	65.96	V / 1.10 / 68	-34.84

Tested by: Greg Jakubowski

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Reviewed by: J. T. Schneider

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Radiated emissions - spurious

FCC 15.231(b), RSS-210 A1.1.2

Test summary

The requirements are: ☒ - MET ☐ - NOT MET
Minimum margin of compliance = 3.3 dB at 3.038 GHz

Test location

☒ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)

Test distance

☒ - 3 meters
☐ - 10 meters

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08
2075	3115	EMCO	Ridge Guide Ant. 1-18 GHz	9001-3275	16-Jan-09
3847	ZHL-1042J	Mini-Circuits	Preamplifier 10 - 3000 MHz	0607	Code B
10527	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0001	Code B
3935	F548B-1	Acronetics	1 – 2 GHz Bandpass Filter	010	Code B
3934	F549B-1	Acronetics	2 – 4 GHz Bandpass Filter	010	Code B
2003	F550B1	Acronetics	4 – 8 GHz Bandpass Filter	010	Code B
3894	NHP-600	Mini-Circuits	30-600 MHz Stopband Filter	2	Code B
3294	8566B	Hewlett-Packard	Spectrum Analyzer	2349A03098	16-May-08
3295	85662A	Hewlett-Packard	Analyzer Display	2349A06144	16-May-08
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08
3800	ESCS 30	Rohde & Schwarz	EMI Receiver	100312	20-Jul-08

Code B = Calibration verification performed internally. Code Y = Calibration not required when used with other calibrated equipment

Test limit

Within the restricted bands of section 15.205

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

In addition to the provisions of 15.205, the field strength of emissions from intentional radiators operated under 15.231 shall not exceed the following

Funda- mental fre- quency (MHz)	Field strength of funda- mental (microvolts/ meter)	Field strength of spurious emissions (microvolts/meter)
40.66– 40.70.	2,250	225
70–130	1,250	125
130–174	¹ 1,250 to 3,750	¹ 125 to 375
174–260	3,750	375
260–470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

Test data

See following pages



RADIATED EMISSIONS



Test Report #: WC800980 Run 2 Test Area: LTS

EUT Model #: 336857 Date: 2/6/2008

EUT Serial #: n/a EUT Power: 12VDC battery Temperature: 23.0 °C

Test Method: FCC 15.231, IC RSS-210 Air Pressure: 99.0 kPa

Customer: Larco Rel. Humidity: 22.0 %

EUT Description: 433 MHz Transmitter, Magnetic Door Sensor

Notes: _____

Data File Name: 0980.dat

Page: 1 of 5

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 15.231 spurious avg	DELTA2 15.231 spurious pk
Begin scan 1 - 4.4 GHz, harmonic measurements maximized						
ESCS 30 receiver used for average measurements < 2.75GHz, Agilent E4440 above 2.75 GHz						
EUT upright, LED up and facing measurement antenna at 0 degrees azimuth						
1.302 GHz	66.95 Pk	4.04 / 25.26 / 41.7 / 0.6	55.15	V / 1.00 / 225	n/a	-18.85
1.302 GHz	58.0 Av	4.04 / 25.26 / 41.7 / 0.59	46.2	V / 1.00 / 225	-7.8	n/a
1.736 GHz	77.15 Pk	4.6 / 26.28 / 42.7 / 0.63	65.96	V / 1.06 / 192	n/a	-14.84
1.736 GHz	67.4 Av	4.6 / 26.28 / 42.7 / 0.63	56.22	V / 1.06 / 192	-4.58	n/a
2.17 GHz	64.9 Pk	5.2 / 28.0 / 43.69 / 0.0	54.78	V / 1.00 / 248	n/a	-26.02
2.17 GHz	57.0 Av	5.2 / 28.0 / 43.69 / 0.37	46.88	V / 1.00 / 248	-13.92	n/a
2.604 GHz	67.25 Pk	5.78 / 29.02 / 44.08 / 0.31	58.28	V / 1.06 / 245	n/a	-22.52
2.604 GHz	59.5 Av	5.78 / 29.02 / 44.08 / 0.31	50.53	V / 1.06 / 245	-10.27	n/a
3.038 GHz	77.2 Pk	6.35 / 30.04 / 43.68 / 0.32	70.23	V / 1.00 / 265	n/a	-10.57
3.038 GHz	70.4 Av	6.35 / 30.04 / 43.68 / 0.32	63.43	V / 1.00 / 265	2.63	n/a
Duty cycle correction factor applied to average measurement. Duty cycle < 50%. 20 log 0.5 = -6 dB						
3.038 GHz	64.4 Av	6.35 / 30.04 / 43.68 / 0.32	57.43	V / 1.00 / 265	-3.37	n/a
3.472 GHz	74.9 Pk	6.88 / 31.06 / 43.77 / 0.42	69.5	V / 1.00 / 6	n/a	-11.3
3.472 GHz	67.8 Av	6.88 / 31.06 / 43.77 / 0.42	62.4	V / 1.00 / 6	1.6	n/a
Duty cycle correction factor applied to average measurement.						
3.472 GHz	61.8 Av	6.88 / 31.06 / 43.77 / 0.42	56.4	V / 1.00 / 6	-4.4	n/a
3.906 GHz	61.15 Pk	7.4 / 32.08 / 43.69 / 0.85	57.79	H / 1.31 / 197	n/a	-16.21

Tested by: Greg Jakubowski

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Reviewed by: J. T. Schneider

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RADIATED EMISSIONS



Test Report #: WC800980 Run 2 Test Area: LTS

EUT Model #: 336857 Date: 2/6/2008

EUT Serial #: n/a EUT Power: 12VDC battery Temperature: 23.0 °C

Test Method: FCC 15.231, IC RSS-210 Air Pressure: 99.0 kPa

Customer: Larco Rel. Humidity: 22.0 %

EUT Description: 433 MHz Transmitter, Magnetic Door Sensor

Notes: _____

Data File Name: 0980.dat

Page: 2 of 5

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 15.231 spurious avg	DELTA2 15.231 spurious pk
3.906 GHz	53.4 Av	7.4 / 32.08 / 43.69 / 0.85	50.04	H / 1.31 / 197	-3.96	n/a
4.34 GHz	57.0 Pk	7.96 / 32.16 / 43.75 / 0.57	53.95	V / 1.00 / 108	n/a	-20.05
4.34 GHz	49.3 Av	7.96 / 32.16 / 43.75 / 0.57	46.25	V / 1.00 / 108	-7.75	n/a
End scan 1 - 4.4 GHz						
Begin scan 30 - 1000 MHz						
867.925 MHz	61.2 Pk	3.06 / 22.77 / 29.64 / 0.3	57.69	V / 1.26 / 86	n/a	-23.11
867.925 MHz	52.0 Av	3.06 / 22.77 / 29.64 / 0.3	48.49	V / 1.26 / 86	-12.31	n/a
End scan 30 MHz - 4.4 GHz						

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RADIATED EMISSIONS



Test Report #: WC800980 Run 2 Test Area: LTS

EUT Model #: 336857 Date: 2/6/2008

EUT Serial #: n/a EUT Power: 12VDC battery Temperature: 23.0 °C

Test Method: FCC 15.231, IC RSS-210 Air Pressure: 99.0 kPa

Customer: Larco Rel. Humidity: 22.0 %

EUT Description: 433 MHz Transmitter, Magnetic Door Sensor

Notes: _____

Data File Name: 0980.dat

Page: 3 of 5

Measurement summary for limit1: 15.231 spurious avg (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 15.231 spurious avg
3.038 GHz	64.4 Av	6.35 / 30.04 / 43.68 / 0.32	57.43	V / 1.00 / 265	-3.37
3.906 GHz	53.4 Av	7.4 / 32.08 / 43.69 / 0.85	50.04	H / 1.31 / 197	-3.96
3.472 GHz	61.8 Av	6.88 / 31.06 / 43.77 / 0.42	56.4	V / 1.00 / 6	-4.4
1.736 GHz	67.4 Av	4.6 / 26.28 / 42.7 / 0.63	56.22	V / 1.06 / 192	-4.58
4.34 GHz	49.3 Av	7.96 / 32.16 / 43.75 / 0.57	46.25	V / 1.00 / 108	-7.75
1.302 GHz	58.0 Av	4.04 / 25.26 / 41.7 / 0.59	46.2	V / 1.00 / 225	-7.8
2.604 GHz	59.5 Av	5.78 / 29.02 / 44.08 / 0.31	50.53	V / 1.06 / 245	-10.27
867.925 MHz	52.0 Av	3.06 / 22.77 / 29.64 / 0.3	48.49	V / 1.26 / 86	-12.31
2.17 GHz	57.0 Av	5.2 / 28.0 / 43.69 / 0.37	46.88	V / 1.00 / 248	-13.92
1.302 GHz	66.95 Pk	4.04 / 25.26 / 41.7 / 0.6	55.15	V / 1.00 / 225	1.15*
1.736 GHz	77.15 Pk	4.6 / 26.28 / 42.7 / 0.63	65.96	V / 1.06 / 192	5.16*
2.17 GHz	64.9 Pk	5.2 / 28.0 / 43.69 / 0.0	54.78	V / 1.00 / 248	-6.02*
2.604 GHz	67.25 Pk	5.78 / 29.02 / 44.08 / 0.31	58.28	V / 1.06 / 245	-2.52*
3.038 GHz	77.2 Pk	6.35 / 30.04 / 43.68 / 0.32	70.23	V / 1.00 / 265	9.43*
3.472 GHz	74.9 Pk	6.88 / 31.06 / 43.77 / 0.42	69.5	V / 1.00 / 6	8.7*
3.906 GHz	61.15 Pk	7.4 / 32.08 / 43.69 / 0.85	57.79	H / 1.31 / 197	3.79*
4.34 GHz	57.0 Pk	7.96 / 32.16 / 43.75 / 0.57	53.95	V / 1.00 / 108	-0.05*
867.925 MHz	61.2 Pk	3.06 / 22.77 / 29.64 / 0.3	57.69	V / 1.26 / 86	-3.11*

Tested by: Greg Jakubowski

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Reviewed by: J. T. Schneider

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RADIATED EMISSIONS



Test Report #: WC800980 Run 2 Test Area: LTS

EUT Model #: 336857 Date: 2/6/2008

EUT Serial #: n/a EUT Power: 12VDC battery Temperature: 23.0 °C

Test Method: FCC 15.231, IC RSS-210 Air Pressure: 99.0 kPa

Customer: Larco Rel. Humidity: 22.0 %

EUT Description: 433 MHz Transmitter, Magnetic Door Sensor

Notes: _____

Data File Name: 0980.dat

Page: 4 of 5

Measurement summary for limit2: 15.231 spurious pk (Pk)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 15.231 spurious pk
3.038 GHz	77.2 Pk	6.35 / 30.04 / 43.68 / 0.32	70.23	V / 1.00 / 265	-10.57
3.472 GHz	74.9 Pk	6.88 / 31.06 / 43.77 / 0.42	69.5	V / 1.00 / 6	-11.3
1.736 GHz	77.15 Pk	4.6 / 26.28 / 42.7 / 0.63	65.96	V / 1.06 / 192	-14.84
3.906 GHz	61.15 Pk	7.4 / 32.08 / 43.69 / 0.85	57.79	H / 1.31 / 197	-16.21
1.302 GHz	66.95 Pk	4.04 / 25.26 / 41.7 / 0.6	55.15	V / 1.00 / 225	-18.85
4.34 GHz	57.0 Pk	7.96 / 32.16 / 43.75 / 0.57	53.95	V / 1.00 / 108	-20.05
2.604 GHz	67.25 Pk	5.78 / 29.02 / 44.08 / 0.31	58.28	V / 1.06 / 245	-22.52
867.925 MHz	61.2 Pk	3.06 / 22.77 / 29.64 / 0.3	57.69	V / 1.26 / 86	-23.11
2.17 GHz	64.9 Pk	5.2 / 28.0 / 43.69 / 0.0	54.78	V / 1.00 / 248	-26.02

Tested by: Greg Jakubowski

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RADIATED EMISSIONS



Test Report #: WC800980 Run 2 Test Area: LTS

EUT Model #: 336857 Date: 2/6/2008

EUT Serial #: n/a EUT Power: 12VDC battery Temperature: 23.0 °C

Test Method: FCC 15.231, IC RSS-210 Air Pressure: 99.0 kPa

Customer: Larco Rel. Humidity: 22.0 %

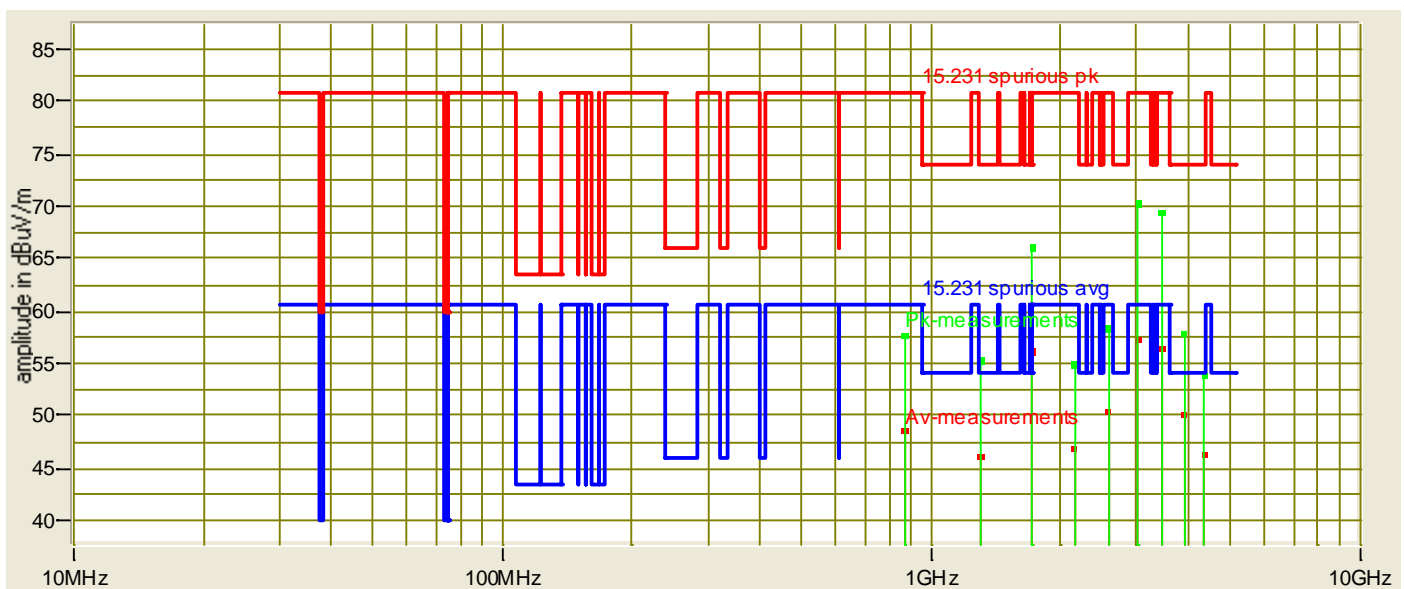
EUT Description: 433 MHz Transmitter, Magnetic Door Sensor

Notes:

Data File Name: 0980.dat

Page: 5 of 5

Graph:



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Bandwidth

FCC 15.321[c], RSS-210 A1.1.3

Test summary

The requirements are: ☒ - MET ☐ - NOT MET

The 20 dB bandwidth = 155.6 kHz

Test location

☒ - Wild River Lab Large Test Site (Open Area Test Site)

☐ - Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08
3847	ZHL-1042J	Mini-Circuits	Preamplifier 10 - 3000 MHz	0607	Code B
3371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08

Code B = Calibration verification performed internally. Code Y = Calibration not required when used with other calibrated equipment

Test limit

No wider than 0.25% of the center frequency or 1.08 MHz

Test data

See following pages

20 dB bandwidth

Agilent 09:39:37 Feb 6, 2008

▲ Mkr1 155.6 kHz
0.06 dB

Ref -32 dBm

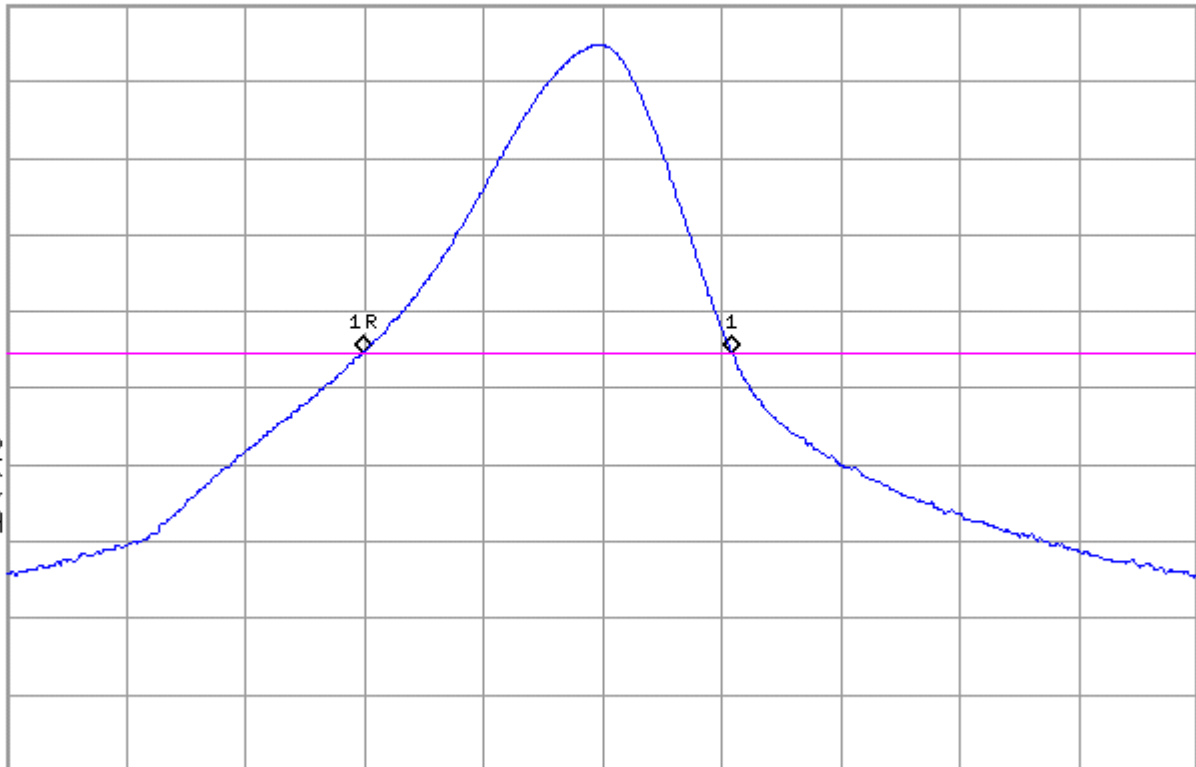
Atten 10 dB

Peak
Log
5
dB/

DI
-54.8
dBm
LgAv

M1 S2
S3 FC
AA

$\mathcal{E}(f)$:
f>50k
#Swp



Center 433.970 0 MHz

Span 500 kHz

#Res BW 30 kHz

#VBW 100 kHz

Sweep 1 ms (1001 pts)

Equipment Under Test (EUT) Test Operation Mode:

The device under test was operated under the following conditions during immunity testing :

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (color bar)
- ☐ - Test program (customer specific)
- ☐ - Practice operation
- ☐ - Normal operating mode
- ☒ - Normal with continuous transmission

Configuration of the device under test:

- ☒ - See Constructional Data Form in Appendix A
- ☐ - See Product Information Form(s) in Appendix A

The following peripheral devices and interface cables were connected during the measurement:

- | | |
|---|----------------|
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - unshielded power cable | |
| <input type="checkbox"/> - unshielded cables | |
| <input type="checkbox"/> - shielded cables | MPS.No.: _____ |
| <input type="checkbox"/> - customer specific cables | |
| <input type="checkbox"/> - _____ | |
| <input type="checkbox"/> - _____ | |

GENERAL REMARKS:

The device under test was modified so that the transmitter remains on continuously for the purpose of measuring transmitter characteristics.

Modifications required to pass:

- ☒ None
- ☐ As indicated on the data sheet(s)

Test Specification Deviations: Additions to or Exclusions from:

- ☒ None
- ☐ As indicated in the Test Plan
- ☐

SUMMARY:

The requirements according to the technical regulations are

- ☒ - met and the equipment under test does fulfill the general approval requirements.
- ☐ - **not** met and the equipment under test does **not** fulfill the general approval requirements.

EUT Received Date: 06 February 2008

Condition of EUT: Normal

Testing Start Date: 06 February 2008

Testing End Date: 06 February 2008

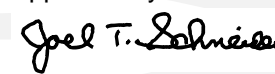
TÜV SÜD AMERICA INC

Tested by:



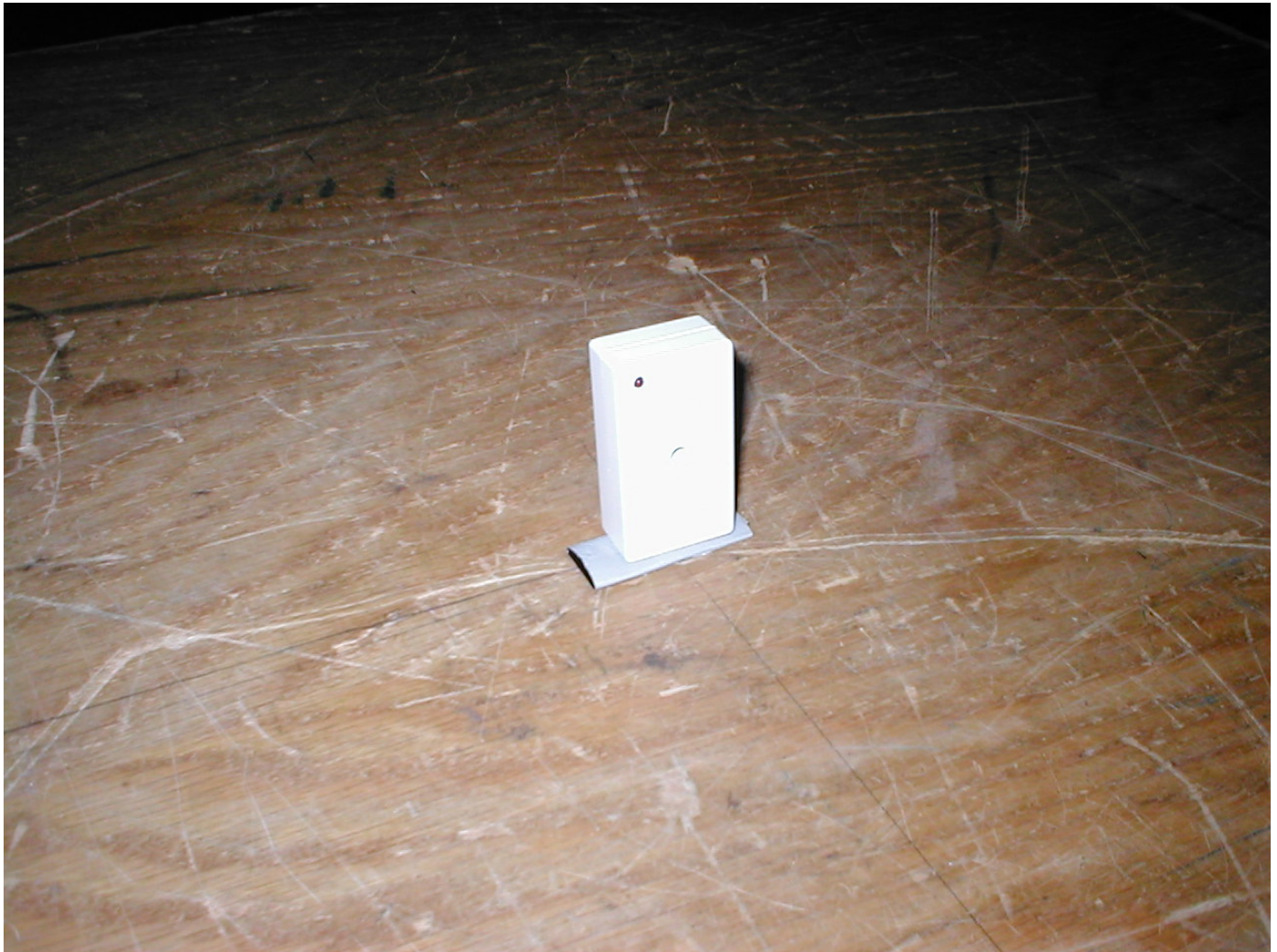
Greg Jakubowski
Senior EMC Technician

Approved by:



Joel T Schneider
Senior EMC Engineer

Test-setup photo(s):
Radiated emissions



Test-setup photo(s):
Radiated emissions



Appendix A

Constructional Data Form

and

Block Diagram





EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.

Company: Larco
 Address: 1902 13th St. SE
Brainerd, MN 56401
 Contact: Dan Pehrson Position: Staff Engineer R&D
 Phone: 218-828-5461 Fax: 218-829-0139
 E-mail Address: dpehrson@larcomfg.com

General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description 433 MHz Transmitter, Magnetic Door Sensor
 EUT Name MDT1
 Model No.: 336857 Serial No.: n/a
 Product Options: none
 Configurations to be tested: normal

Equipment Modification (If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)

Modifications since last test: _____
 Modifications made during test: _____

Test Objective(s): Please indicate the tests to be performed, entering the applicable standard(s) where noted.

- | | |
|---|---|
| <input type="checkbox"/> EMC Directive 2004/108/EC (EMC)
Std: _____ | <input checked="" type="checkbox"/> FCC: Class <input type="checkbox"/> A <input type="checkbox"/> B Part _____ |
| <input type="checkbox"/> Machinery Directive 89/392/EEC (EMC)
Std: _____ | <input type="checkbox"/> VCCI: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| <input type="checkbox"/> Medical Device Directive 93/42/EEC (EMC)
Std: _____ | <input type="checkbox"/> BSMI: Class <input type="checkbox"/> A <input type="checkbox"/> B (Separate Report) |
| <input type="checkbox"/> Vehicle Directive: <input type="checkbox"/> 2001/3/EC (EMC) <input type="checkbox"/> 2004/104/EC (EMC) | <input type="checkbox"/> Canada: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| <input type="checkbox"/> Other Vehicle Std: _____ | <input type="checkbox"/> Australia: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| <input type="checkbox"/> FDA Reviewers Guidance for Premarket Notification Submissions (EMC) | <input type="checkbox"/> Other: _____ |

Third Party Certification, if applicable (*Signature on Page 6 Required)

- | | |
|---|---|
| <input type="checkbox"/> Attestation of Conformity (AoC)* | <input type="checkbox"/> EMC Certification (used with Octagon Mark)* |
| <input type="checkbox"/> Certificate of Conformity (CoC)* | <input type="checkbox"/> Compliance Document* |
| Protection Class (N/A for vehicles) | <input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III |
| (Press F1 when field is selected to show additional information on Protection Class.) | |
| <input checked="" type="checkbox"/> FCC / TCB Certification | <input checked="" type="checkbox"/> Industry Canada / FCB Certification |
| <input type="checkbox"/> E-Mark Certification | <input type="checkbox"/> Taiwan Certification |

**EMC Test Plan and Constructional Data Form****Attendance**Test will be: ☐ Attended by the customer ☒ Unattended by the customer**Failure - Complete this section if testing will not be attended by the customer.**

If a failure occurs, TÜV America should:

- ☒ Call contact listed above, if not available then stop testing. (After hrs phone): 651-485-6927
- ☐ Continue testing to complete test series.
- ☐ Continue testing to define corrective action.
- ☐ Stop testing.

EUT Specifications and Requirements

Length: _____ Width: _____ Height: _____ Weight: _____

Power Requirements*Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)*Voltage: 12VDC (If battery powered, make sure battery life is sufficient to complete testing.)

of Phases: _____

Current (Amps/phase(max)): _____ Current (Amps/phase(nominal)): 7mA

Other _____

Other Special Requirements**Typical Installation and/or Operating Environment**

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Hospital, Business

EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): _____

☐ Shielded OR ☐ Unshielded

☐ Not Applicable

EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables														
Type	Analog	Digital	During Test		Qty	Shielding		Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent	
			Active	Passive		Yes	No							Type
EXAMPLE: RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>

**EMC Test Plan and Constructional Data Form****EUT Software.**

Revision Level: 1.0

Description: Normal operation. Device transmits when reed switch is opened. Transmission is a rolling code after every transmission string.

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test.

It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. normal with continuous transmission
- 2.
- 3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #



EMC Test Plan and Constructional Data Form

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)
This information is required for FCC & Taiwan testing.

<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>

Oscillator Frequencies

<i>Manufacturer</i>	<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
EPCOS	433.92MHZ	433.92MHz		SAW Resonator

Power Supply

<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

Power Line Filters

<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>

**EMC Test Plan and Constructional Data Form****Critical EMI Components (Capacitors, ferrites, etc.)**

<i>Description</i>	<i>Manufacturer</i>	<i>Part # or Value</i>	<i>Qty</i>	<i>Component # / Location</i>

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

Authorization Signatures (Signature Required for Certifications checked on pg 1)

A handwritten signature in black ink, appearing to read 'Dan Pehrson'.

Customer authorization to perform tests
according to this test plan._____
Dan Pehrson_____
Test Plan/CDF Prepared By (please print)_____
January 31, 2008_____
Date_____
January 31, 2008_____
Date



EMC Block Diagram Form

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.

433MHz Transmitter –
12V

Authorization Signatures

January 31, 2008

A handwritten signature in black ink, appearing to read 'Dan Pehrson'.

Customer authorization to perform tests
according to this test plan.

Date

Dan Pehrson

January 31, 2008

Test Plan/CDF Prepared By (please print)

Date

WIRELESS MAGNET OPEN/CLOSE DETECTORS

Model **336857** 12V transmitters

Model **336858** 9V transmitters

336857/336858 detectors with built-in reed contact and external switching magnet include low power radio transmitter and are used in wireless monitoring of doors, window, gates, etc., in alarm & security applications. Programmed to Larco's 433MHz receiver the detectors operate in one of the two modes selected by jumper J1, as shown in table below:

	Opening of door/window	Closing of door/window
J1 shorted	Single transmission – setting receiver's channel output to ON for a programmed time	No transmission – no reaction of the receiver
J1 Opened	Three transmissions in random time intervals – setting receiver's channel output to ON	Three transmissions in random time intervals – receiver's channel output set to OFF

IMPORTANT! After every operating mode selection change the receiver must re-learn the transmitter.

The **336857/336858** detectors' main features: dynamic code hopping encryption for highest level of signal security; low current consumption allowing up to 1 year (model 336857) and 3 years (model 336858) of operation on single battery; LED alarm indication selectable to OFF for battery saving.

Teaching 336857/336858 detectors to Larco's receivers (model 233804)

Please refer to the Receiver documentation to program. Use the external magnet with the detector box closed to trigger transmission.

Installation

The detector operates indoors, within temperature range of 32° to 100° F. Installation location should be dry and far from electromagnetic lines, radio modules, metal screening and other devices that may cause interference and reduce operating range. Prior to firm installation tests should be made to determine practical operating range. The external magnet should be installed on movable part of the monitored object, so that in closest position the magnet is no more than 3/8 inch from the detector's box reed side. Plastic insert is supplied to cover center screw hole.

Specification

- 433.92 MHz frequency band and 150-300 feet operating range in open field
- 336857 power supply: 12V GP23A alkaline battery (current 0.006 mA at standby)
- 336858 power supply: 9V alkaline battery (current 0.010 mA at standby)
- External magnet maximum distance 0.40 inches from box reed contact side



Appendix B

Measurement protocol



MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Emissions testing is performed according to the procedures in ANSI C63.4-2003.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of ± 1.8 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of ± 4.8 dB. The equipment comprising the test systems is calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

Conducted Emissions

The final level, in dB μ V, equals the EMI receiver level plus the cable loss and LISN factor.

Radiated Emissions

The final level, in dB μ V/m, equals the reading from the spectrum analyzer (Level dB μ V), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Attachment A. Intentional radiators are rotated through 3 orthogonal axes to determine the test position yielding the maximum emission levels.

Example:

FREQ (MHz)	LEVEL (dB μ V)	CABLE/ANT/PREAMP			FINAL (dB μ V/m)	POL/HGT/AZ			DELTA1
		(dB)	(dB/m)	(dB)		(m)	(deg)		
60.80	42.5Qp +	1.2	+ 10.9	- 25.5 =	29.1	V	1.0	0.0	-10.9

Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.