

TEST RESULT SUMMARY

FCC PART 15 SUBPART C

Section 15.245

Industry Canada RSS-210: Issue 7: 2007

Annex 7

RSS-GEN, Issue 2:2007

| | |
|------------------------|--|
| MANUFACTURER'S NAME | Larco Manufacturing |
| NAME OF EQUIPMENT | Contactless Sensor Switch |
| MODEL NUMBER | 336806 |
| MANUFACTURER'S ADDRESS | 1902 13 th Street SE PO Box 547 Brainerd MN 56401 |
| TEST REPORT NUMBER | WC706424 Rev B |
| TEST DATE | 21 September 2007 |

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15 Subpart C Section 15.245 and RSS-210, Annex 7.

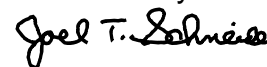
It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production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

TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15 Subpart C Section 15.245 and RSS-210, Annex 7.

Date: 13 December 2007

Tested By

Reviewed By



Location: Taylors Falls MN
USA

Ross M Johnson
Senior EMC Technician

Joel T Schneider
Senior EMC Engineer

Not Transferable

EMC EMISSION - TEST REPORT

Test Report File No. : **WC706424 Rev B** Date of issue: 13 December 2007

Model No. / Serial No. : 336806 / A723SH85000106

Product Name : Contactless Sensor Switch

Applicant : Larco Manufacturing

Manufacturer : Larco Manufacturing

License holder : Larco Manufacturing

Address : 1902 13th Street SE, P.O. Box 547
: Brainerd MN 56401 US

Test Result : **Positive** **Negative**

Test Project Number : WC706424 Rev B
Reference(s)

Total pages : 36

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service 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 Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

REVISION RECORD

| REVISION | TOTAL NUMBER OF PAGES | DATE | DESCRIPTION |
|----------|-----------------------|------------------|---|
| | 37 | 24 October 2007 | Initial Release |
| A | 37 | 07 November 2007 | Revisions include: <ul style="list-style-type: none"> ▪ Appendix A: Added corrected data. |
| B | 36 | 13 December 2007 | Revisions include: <ul style="list-style-type: none"> ▪ Pages 13-18: Revision to radiated emissions run 1. |

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Test data

FCC Section

RSS-210 Section

| | | | |
|---|--------------|---------|---------|
| AC conducted emissions | 15.207 | RSS-GEN | 4 - 9 |
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| Emission Bandwidth | N/A | RSS-GEN | 20 - 21 |

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- EN 50081-1 / 1991
 - EN 55011 / 1998
 - w/Amendment A1:1999
 - EN 55013 / 1990
 - EN 55014 / 1987

 - EN 55014 / A2: 1990
 - EN 55014 / 1993

 - EN 55015 / 1987
 - EN 55015 / A1:1990
 - EN 55015 / 1993
 - EN 55022 / 1987
 - FCC Part 15 Subpart C Section 15.245
 - FCC Part 15 Subpart C Section 15.207 Conducted Emission Requirements
 - RSS-210, Issue 7, 2007 – Annex 7
 - RSS-GEN, Issue 2, 2007
- Group 1
 - Class A

 - Household appliances and similar
 - Portable tools
 - Semiconductor devices

 - Household appliances and similar
 - Portable tools
 - Semiconductor devices

 - Class A
 - Class B

Emissions Test Conditions: CONDUCTED EMISSIONS on AC mains (Interference Voltage)

The **CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)** measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Wild River Shield Room 1 - Anechoic ferrite-lined shielded room (7.3m x 3.7m x 3.7m) or (24' x 12' x 12')
- Wild River Shield Room 2 - Shielded room (3.7m x 3.5m x 2.4m) or (12' x 11.5' x 8')
- Oakwood Lab (Open Area Test Site)
- New Brighton Lab Shielded Room

Emission Test Results:

Test Results - Conducted emissions 150 kHz - 30 MHz

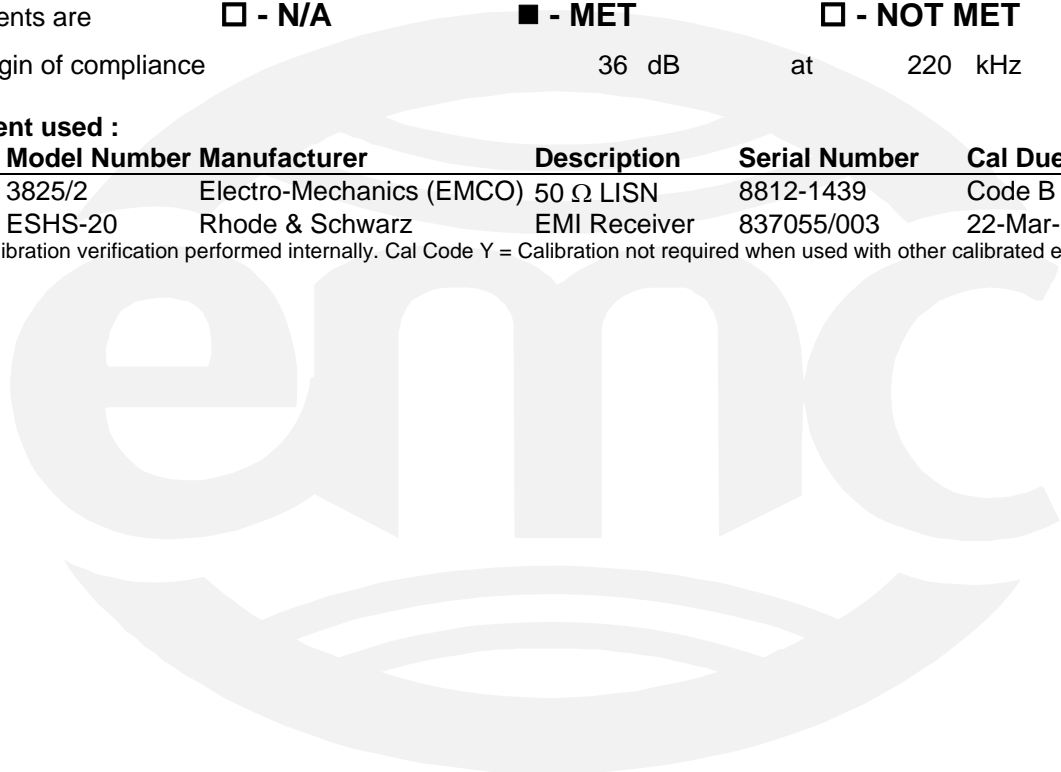
The requirements are - N/A - MET - NOT MET

Minimum margin of compliance 36 dB at 220 kHz

Test equipment used :

| TUV ID | Model Number | Manufacturer | Description | Serial Number | Cal Due |
|----------|--------------|--------------------------|--------------|---------------|-----------|
| ■ - 2417 | 3825/2 | Electro-Mechanics (EMCO) | 50 Ω LISN | 8812-1439 | Code B |
| ■ - 2534 | ESHS-20 | Rhode & Schwarz | EMI Receiver | 837055/003 | 22-Mar-08 |

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



CONDUCTED EMISSIONS



America

Test Report #: WC706424 Run 2 Test Area: LTS

EUT Model #: SG8500 Date: 9/21/2007

EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C

Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa

Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %

EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat

Page: 1 of 5

List of measurements for run #: 2

| FREQ | LEVEL (dBuV) | CABLE / ANT / PREAMP / ATTEN (dB) | FINAL (dBuV / m) | EUT Lead | DELTA1 EN55022 B Qp | DELTA2 EN55022 B Avg |
|-----------|--------------|-----------------------------------|------------------|----------|---------------------|----------------------|
| 160.0 kHz | 28.09 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 28.31 | L1 | -37.16 | n/a |
| 175.0 kHz | 27.51 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 27.73 | L1 | -36.99 | n/a |
| 190.0 kHz | 27.03 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 27.25 | L1 | -36.78 | n/a |
| 205.0 kHz | 26.63 Qp | 0.13 / 0.1 / 0.0 / 0.0 | 26.86 | L1 | -36.55 | n/a |
| 220.0 kHz | 26.09 Qp | 0.13 / 0.1 / 0.0 / 0.0 | 26.32 | L1 | -36.5 | n/a |
| 700.0 kHz | 15.49 Qp | 0.21 / 0.03 / 0.0 / 0.0 | 15.73 | L1 | -40.27 | n/a |
| 6.27 MHz | -2.83 Qp | 0.62 / 0.15 / 0.0 / 0.0 | -2.06 | L1 | -62.06 | n/a |
| 160.0 kHz | 1.5 Av | 0.12 / 0.1 / 0.0 / 0.0 | 1.72 | L1 | n/a | -53.75 |
| 175.0 kHz | 2.01 Av | 0.12 / 0.1 / 0.0 / 0.0 | 2.23 | L1 | n/a | -52.49 |
| 190.0 kHz | 0.8 Av | 0.12 / 0.1 / 0.0 / 0.0 | 1.02 | L1 | n/a | -53.01 |
| 205.0 kHz | -0.42 Av | 0.13 / 0.1 / 0.0 / 0.0 | -0.19 | L1 | n/a | -53.6 |
| 220.0 kHz | 1.35 Av | 0.13 / 0.1 / 0.0 / 0.0 | 1.58 | L1 | n/a | -51.24 |
| 700.0 kHz | -5.81 Av | 0.21 / 0.03 / 0.0 / 0.0 | -5.57 | L1 | n/a | -51.57 |
| 6.27 MHz | -6.12 Av | 0.62 / 0.15 / 0.0 / 0.0 | -5.35 | L1 | n/a | -55.35 |
| 160.0 kHz | 28.11 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 28.33 | N | -37.14 | n/a |
| 175.0 kHz | 27.47 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 27.69 | N | -37.03 | n/a |
| 190.0 kHz | 26.97 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 27.19 | N | -36.84 | n/a |
| 205.0 kHz | 26.57 Qp | 0.13 / 0.1 / 0.0 / 0.0 | 26.8 | N | -36.61 | n/a |
| 220.0 kHz | 26.13 Qp | 0.13 / 0.1 / 0.0 / 0.0 | 26.36 | N | -36.46 | n/a |
| 700.0 kHz | 16.65 Qp | 0.21 / 0.03 / 0.0 / 0.0 | 16.89 | N | -39.11 | n/a |
| 6.27 MHz | 12.03 Qp | 0.62 / 0.15 / 0.0 / 0.0 | 12.8 | N | -47.2 | n/a |
| 160.0 kHz | 1.5 Av | 0.12 / 0.1 / 0.0 / 0.0 | 1.72 | N | n/a | -53.75 |
| 175.0 kHz | 2.08 Av | 0.12 / 0.1 / 0.0 / 0.0 | 2.3 | N | n/a | -52.42 |
| 190.0 kHz | 0.47 Av | 0.12 / 0.1 / 0.0 / 0.0 | 0.69 | N | n/a | -53.34 |

Tested by: R. M. Johnson

Printed

Signature

Reviewed by: J. T. Schneider

Printed

Signature

CONDUCTED EMISSIONS



America

Test Report #: WC706424 Run 2 Test Area: LTS
 EUT Model #: SG8500 Date: 9/21/2007
 EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C
 Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa
 Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %
 EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat

Page: 2 of 5

List of measurements for run #: 2

| FREQ | LEVEL (dBuV) | CABLE / ANT / PREAMP / ATTEN (dB) | FINAL (dBuV / m) | EUT Lead | DELTA1 EN55022 B Qp | DELTA2 EN55022 B Avg |
|-----------|--------------|-----------------------------------|------------------|----------|---------------------|----------------------|
| 205.0 kHz | -0.28 Av | 0.13 / 0.1 / 0.0 / 0.0 | -0.05 | N | n/a | -53.46 |
| 220.0 kHz | 0.3 Av | 0.13 / 0.1 / 0.0 / 0.0 | 0.53 | N | n/a | -52.29 |
| 700.0 kHz | -5.39 Av | 0.21 / 0.03 / 0.0 / 0.0 | -5.15 | N | n/a | -51.15 |
| 6.27 MHz | -6.16 Av | 0.62 / 0.15 / 0.0 / 0.0 | -5.39 | N | n/a | -55.39 |

END OF SCAN.

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CONDUCTED EMISSIONS



America

Test Report #: WC706424 Run 2 Test Area: LTS
 EUT Model #: SG8500 Date: 9/21/2007
 EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C
 Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa
 Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %
 EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat

Page: 3 of 5

Measurement summary for limit1: EN55022 B Qp (Qp)

| FREQ | LEVEL (dBuV) | CABLE / ANT / PREAMP / ATTEN (dB) | FINAL (dBuV / m) | EUT Lead | DELTA1 EN55022 B Qp |
|-----------|--------------|-----------------------------------|------------------|----------|---------------------|
| 220.0 kHz | 26.13 Qp | 0.13 / 0.1 / 0.0 / 0.0 | 26.36 | N | -36.46 |
| 205.0 kHz | 26.63 Qp | 0.13 / 0.1 / 0.0 / 0.0 | 26.86 | L1 | -36.55 |
| 190.0 kHz | 27.03 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 27.25 | L1 | -36.78 |
| 175.0 kHz | 27.51 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 27.73 | L1 | -36.99 |
| 160.0 kHz | 28.11 Qp | 0.12 / 0.1 / 0.0 / 0.0 | 28.33 | N | -37.14 |
| 700.0 kHz | 16.65 Qp | 0.21 / 0.03 / 0.0 / 0.0 | 16.89 | N | -39.11 |
| 6.27 MHz | 12.03 Qp | 0.62 / 0.15 / 0.0 / 0.0 | 12.8 | N | -47.2 |

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Reviewed by: J. T. Schneider

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Signature

CONDUCTED EMISSIONS



America

Test Report #: WC706424 Run 2 Test Area: LTS

EUT Model #: SG8500 Date: 9/21/2007

EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C

Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa

Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %

EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat Page: 4 of 5

Measurement summary for limit2: EN55022 B Avg (Av)

| FREQ | LEVEL (dBuV) | CABLE / ANT / PREAMP / ATTEN (dB) | FINAL (dBuV / m) | EUT Lead | DELTA2 EN55022 B Avg |
|-----------|-----------------|---|---------------------|----------|----------------------------|
| 700.0 kHz | -5.39 Av | 0.21 / 0.03 / 0.0 / 0.0 | -5.15 | N | -51.15 |
| 220.0 kHz | 1.35 Av | 0.13 / 0.1 / 0.0 / 0.0 | 1.58 | L1 | -51.24 |
| 175.0 kHz | 2.08 Av | 0.12 / 0.1 / 0.0 / 0.0 | 2.3 | N | -52.42 |
| 190.0 kHz | 0.8 Av | 0.12 / 0.1 / 0.0 / 0.0 | 1.02 | L1 | -53.01 |
| 205.0 kHz | -0.28 Av | 0.13 / 0.1 / 0.0 / 0.0 | -0.05 | N | -53.46 |
| 160.0 kHz | 1.5 Av | 0.12 / 0.1 / 0.0 / 0.0 | 1.72 | L1 | -53.75 |
| 6.27 MHz | -6.12 Av | 0.62 / 0.15 / 0.0 / 0.0 | -5.35 | L1 | -55.35 |

Tested by: R. M. Johnson

Printed

R. M. Johnson

Signature

Reviewed by: J. T. Schneider

Printed

Joel T. Schneider

Signature

CONDUCTED EMISSIONS



America

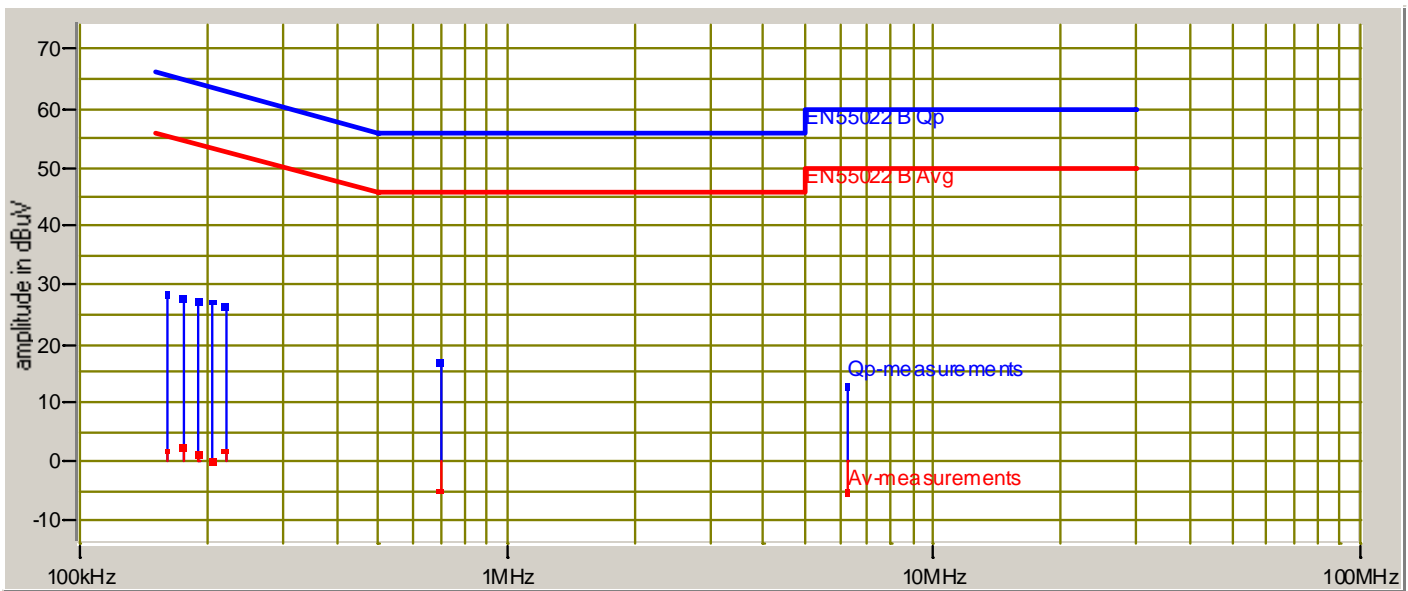
Test Report #: WC706424 Run 2 Test Area: LTS
 EUT Model #: SG8500 Date: 9/21/2007
 EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C
 Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa
 Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %

EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat Page: 5 of 5

Graph:



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R. M. Johnson

 Signature

Reviewed by: J. T. Schneider

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Joel T. Schneider

 Signature

Fundamental Field Strength

Specifications:

FCC Specification: Paragraph: 15.245 (b)

IC Specification: RSS-210, Annex 7

The **FUNDAMENTAL FIELD STRENGTH** measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room

Test equipment used :

| TUV ID | Model Number | Manufacturer | Description | Serial Number | Cal Due |
|----------|--------------|---------------------|---------------------------|---------------|-----------|
| ■ - 3294 | 8566B | Hewlett-Packard | Spectrum Analyzer | 2349A03098 | 16-May-08 |
| ■ - 3295 | 85662A | Hewlett-Packard | Analyzer Display | 2349A06144 | 16-May-08 |
| ■ - 3958 | SL18B4020 | Phase One Microwave | Preamplifier 1 – 18 GHz | 0002 | Code B |
| ■ - 2075 | 3115 | EMCO | Ridge Guide Ant. 1-18 GHz | 9001-3275 | 12-Jan-08 |

Cal Code B = Calibration verification performed internally.

Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Fundamental Field Strength [FCC 15.245 (b)], [RSS-210 Annex 7]

The requirements are

- MET

- NOT MET

Minimum margin of compliance

14.26 dB

at

10.52 GHz

Remarks: The fundamental was measured to be 113.69 dBuV/m (483.6 mV/m) in peak mode compared to an average limit of 127.95 dBuV/m (2500mV/m).

Harmonic Emissions

Specifications:

FCC Specification: Paragraph: 15.245 (b)(1)

IC Specification: RSS-210, Annex 7

The Harmonic Emission measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room

Test equipment used :

| TUV ID | Model Number | Manufacturer | Description | Serial Number | Cal Due |
|----------|--------------|---------------------|----------------------------|---------------|-----------|
| ■ - 3294 | 8566B | Hewlett-Packard | Spectrum Analyzer | 2349A03098 | 16-May-08 |
| ■ - 3295 | 85662A | Hewlett-Packard | Analyzer Display | 2349A06144 | 16-May-08 |
| ■ - 2681 | 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2430A00562 | 23-Mar-08 |
| ■ - 3847 | ZHL-1042J | Mini-Circuits | Preamplifier 10 - 3000 MHz | 0607 | Code B |
| ■ - 3958 | SL18B4020 | Phase One Microwave | Preamplifier 1 – 18 GHz | 0002 | Code B |
| ■ - 2075 | 3115 | EMCO | Ridge Guide Ant. 1-18 GHz | 9001-3275 | 12-Jan-08 |
| ■ - 2920 | 11970V | Hewlett-Packard | Harm Mixer – 50-75 GHz | 2521A01172 | 18-Jan-10 |
| ■ - 2918 | 19-7025 | Aerowave Inc | Horn Antenna – 40-60 GHz | | N/A |
| ■ - 2917 | 15-7025 | Aerowave Inc | Horn Antenna – 50-75 GHz | | N/A |
| ■ - 2916 | 10-7025 | Aerowave Inc | Horn Antenna–75-110 GHz | | N/A |

Cal Code B = Calibration verification performed internally.

Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Harmonic Emissions [FCC 15.245 (b)(1)], [RSS-210 Annex 7]

The requirements are - MET - NOT MET

Minimum margin of compliance for Harmonics <10 dB at GHz

Remarks: There were no harmonics within 10 dB of the limit

Radiated Emissions Outside of the specified frequency bands

Specifications:

FCC Specification: Paragraph: 15.245 (b)(3)

IC Specification: RSS-210, Annex 7

The **Radiated Emission** measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room

Test equipment used :

| TUV ID | Model Number | Manufacturer | Description | Serial Number | Cal Due |
|----------|--------------|---------------------|----------------------------|---------------|-----------|
| ■ 3294 | 8566B | Hewlett-Packard | Spectrum Analyzer | 2349A03098 | 16-May-08 |
| ■- 3295 | 85662A | Hewlett-Packard | Analyzer Display | 2349A06144 | 16-May-08 |
| ■ - 2681 | 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2430A00562 | 23-Mar-08 |
| ■ - 3847 | ZHL-1042J | Mini-Circuits | Preamplifier 10 - 3000 MHz | 0607 | Code B |
| ■ - 3958 | SL18B4020 | Phase One Microwave | Preamplifier 1 – 18 GHz | 0002 | Code B |
| ■ - 2075 | 3115 | EMCO | Ridge Guide Ant. 1-18 GHz | 9001-3275 | 12-Jan-08 |
| ■ - 6717 | 3116 | EMCO | Ridge Guide Ant 18-40 GHz | 2005 | 05 Oct 07 |
| ■ - 2662 | 11970K | Hewlett-Packard | Harm Mixer – 18-26.5 GHz | 2332A01170 | 04 Sep 09 |
| ■ - 2661 | 11970A | Hewlett-Packard | Harm Mixer – 26.5-40 GHz | 2332A01861 | 04 Sep 09 |
| ■ - 2918 | 19-7025 | Aerowave Inc | Horn Antenna – 40-60 GHz | | N/A |
| ■ - 2919 | 11970U | Hewlett-Packard | Harm Mixer – 40-60 GHz | 3003A01395 | 04 Sep 09 |
| ■ - 2916 | 10-7025 | Aerowave Inc | Horn Antenna - 75-110 GHz | | N/A |
| ■ - 2922 | 11970W | Hewlett-Packard | Harm Mixer – 75-110 GHz | 2521A01336 | 18-Jan-10 |
| ■ - 2920 | 11970V | Hewlett-Packard | Harm Mixer – 50-75 GHz | 2521A01172 | 18-Jan-10 |
| ■ - 2917 | 15-7025 | Aerowave Inc | Horn Antenna – 50-75 GHz | | N/A |

Cal Code B = Calibration verification performed internally.

Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Radiated Emissions outside of the specified frequency bands [FCC 15.245 (b)(3)], [RSS-210 Annex 7]

The requirements are

■ - MET

□ - NOT MET

Minimum margin of compliance for spurious emissions

1.85 dB

at

300.641 MHz

Remarks: 50.99 MHz was measured to be 31.7 dBuV/m (38 uV/m) in quasi-peak mode compared to a limit of 40 dBuV/m (100 uV/m).

RADIATED EMISSIONS



Test Report #: WC706424 Run 1 Test Area: LTS
 EUT Model #: SG8500 Date: 9/21/2007
 EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C
 Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa
 Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %
 EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat

Page: 1 of 5

List of measurements for run #: 1

| FREQ | LEVEL (dBuV) | CABLE / ANT / PREAMP / ATTEN (dB) | FINAL (dBuV / m) | POL / HGT / AZ (m)(DEG) | DELTA1 FCC-B <1GHz 3m | DELTA2 |
|-------------|--------------|-----------------------------------|------------------|-------------------------|-----------------------|--------|
| 48.204 MHz | 41.7 Qp | 0.53 / 14.65 / 29.5 / 0.0 | 27.38 | V / 1.00 / 0 | -12.62 | n/a |
| 56.01 MHz | 38.25 Qp | 0.69 / 12.56 / 29.4 / 0.0 | 22.1 | V / 1.00 / 0 | -17.9 | n/a |
| 72.318 MHz | 39.45 Qp | 0.82 / 9.48 / 29.3 / 0.0 | 20.45 | V / 1.00 / 0 | -19.55 | n/a |
| 112.507 MHz | 41.2 Qp | 0.98 / 9.44 / 29.5 / 0.0 | 22.11 | V / 1.00 / 0 | -21.39 | n/a |
| 114.517 MHz | 39.0 Qp | 0.98 / 9.31 / 29.5 / 0.0 | 19.79 | V / 1.00 / 0 | -23.71 | n/a |
| 116.527 MHz | 39.35 Qp | 0.99 / 9.18 / 29.5 / 0.0 | 20.01 | V / 1.00 / 0 | -23.49 | n/a |
| 118.55 MHz | 38.6 Qp | 0.99 / 9.04 / 29.5 / 0.0 | 19.14 | V / 1.00 / 0 | -24.36 | n/a |
| 120.548 MHz | 41.8 Qp | 1.0 / 8.91 / 29.5 / 0.0 | 22.21 | V / 1.00 / 0 | -21.29 | n/a |
| 122.552 MHz | 38.65 Qp | 1.0 / 8.78 / 29.5 / 0.0 | 18.94 | V / 1.00 / 0 | -24.56 | n/a |
| 124.562 MHz | 37.5 Qp | 1.01 / 8.65 / 29.5 / 0.0 | 17.67 | V / 1.00 / 0 | -25.83 | n/a |
| 136.622 MHz | 38.6 Qp | 1.06 / 9.01 / 29.5 / 0.0 | 19.16 | V / 1.00 / 0 | -24.34 | n/a |
| 180.83 MHz | 33.7 Qp | 1.29 / 10.17 / 29.49 / 0.0 | 15.67 | V / 1.00 / 0 | -27.83 | n/a |
| 212.985 MHz | 34.75 Qp | 1.4 / 10.89 / 29.7 / 0.0 | 17.34 | V / 1.00 / 0 | -26.16 | n/a |
| 221.019 MHz | 34.65 Qp | 1.42 / 11.12 / 29.7 / 0.0 | 17.49 | V / 1.00 / 0 | -28.51 | n/a |
| 237.099 MHz | 38.35 Qp | 1.45 / 11.58 / 29.54 / 0.0 | 21.85 | V / 1.00 / 0 | -24.15 | n/a |
| 239.109 MHz | 38.15 Qp | 1.46 / 11.64 / 29.51 / 0.0 | 21.74 | V / 1.00 / 0 | -24.26 | n/a |
| 339.579 MHz | 33.2 Qp | 1.89 / 14.53 / 29.6 / 0.0 | 20.02 | V / 1.00 / 0 | -25.98 | n/a |
| 56.01 MHz | 38.95 Qp | 0.69 / 12.56 / 29.4 / 0.0 | 22.8 | V / 1.00 / 90 | -17.2 | n/a |
| 120.548 MHz | 42.65 Qp | 1.0 / 8.91 / 29.5 / 0.0 | 23.06 | V / 1.00 / 90 | -20.44 | n/a |
| 122.552 MHz | 40.35 Qp | 1.0 / 8.78 / 29.5 / 0.0 | 20.64 | V / 1.00 / 90 | -22.86 | n/a |
| 124.562 MHz | 38.9 Qp | 1.01 / 8.65 / 29.5 / 0.0 | 19.07 | V / 1.00 / 90 | -24.43 | n/a |
| 180.83 MHz | 36.25 Qp | 1.29 / 10.17 / 29.49 / 0.0 | 18.22 | V / 1.00 / 90 | -25.28 | n/a |
| 212.985 MHz | 34.6 Qp | 1.4 / 10.89 / 29.7 / 0.0 | 17.19 | V / 1.00 / 90 | -26.31 | n/a |
| 48.204 MHz | 43.4 Qp | 0.53 / 14.65 / 29.5 / 0.0 | 29.08 | V / 1.00 / 180 | -10.92 | n/a |
| 56.01 MHz | 40.95 Qp | 0.69 / 12.56 / 29.4 / 0.0 | 24.8 | V / 1.00 / 180 | -15.2 | n/a |

Tested by: R. M. Johnson

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Reviewed by: J. T. Schneider

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RADIATED EMISSIONS



Test Report #: WC706424 Run 1 Test Area: LTS
 EUT Model #: SG8500 Date: 9/21/2007
 EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C
 Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa
 Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %
 EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat

Page: 2 of 5

List of measurements for run #: 1

| FREQ | LEVEL (dBuV) | CABLE / ANT / PREAMP / ATTEN (dB) | FINAL (dBuV / m) | POL / HGT / AZ (m)(DEG) | DELTA1 FCC-B <1GHz 3m | DELTA2 |
|-----------------------|--------------|-----------------------------------|------------------|-------------------------|-----------------------|--------|
| 112.507 MHz | 43.05 Qp | 0.98 / 9.44 / 29.5 / 0.0 | 23.96 | V / 1.00 / 180 | -19.54 | n/a |
| 116.527 MHz | 42.35 Qp | 0.99 / 9.18 / 29.5 / 0.0 | 23.01 | V / 1.00 / 180 | -20.49 | n/a |
| 212.985 MHz | 35.1 Qp | 1.4 / 10.89 / 29.7 / 0.0 | 17.69 | V / 1.00 / 180 | -25.81 | n/a |
| 221.019 MHz | 35.4 Qp | 1.42 / 11.12 / 29.7 / 0.0 | 18.24 | V / 1.00 / 180 | -27.76 | n/a |
| 237.099 MHz | 40.0 Qp | 1.45 / 11.58 / 29.54 / 0.0 | 23.5 | V / 1.00 / 180 | -22.5 | n/a |
| 239.109 MHz | 38.55 Qp | 1.46 / 11.64 / 29.51 / 0.0 | 22.14 | V / 1.00 / 180 | -23.86 | n/a |
| 339.579 MHz | 37.35 Qp | 1.89 / 14.53 / 29.6 / 0.0 | 24.17 | V / 1.00 / 180 | -21.83 | n/a |
| | | | | | | |
| 118.55 MHz | 43.95 Qp | 0.99 / 9.04 / 29.5 / 0.0 | 24.49 | V / 1.00 / 270 | -19.01 | n/a |
| | | | | | | |
| 64.272 MHz | 42.55 Qp | 0.76 / 10.8 / 29.4 / 0.0 | 24.71 | V / 1.00 / 270 | -15.29 | n/a |
| 80.352 MHz | 40.85 Qp | 0.87 / 8.16 / 29.32 / 0.0 | 20.56 | V / 1.00 / 270 | -19.44 | n/a |
| | | | | | | |
| MAXIMIZED. | | | | | | |
| 48.204 MHz | 44.15 Qp | 0.53 / 14.65 / 29.5 / 0.0 | 29.83 | V / 1.00 / 192 | -10.17 | n/a |
| | | | | | | |
| END OF VERTICAL SCAN. | | | | | | |
| | | | | | | |
| 315.485 MHz | 33.05 Qp | 1.78 / 13.84 / 29.81 / 0.0 | 18.86 | H / 1.00 / 0 | -27.14 | n/a |
| 323.501 MHz | 34.45 Qp | 1.82 / 14.07 / 29.74 / 0.0 | 20.6 | H / 1.00 / 0 | -25.4 | n/a |
| | | | | | | |
| 259.209 MHz | 34.75 Qp | 1.5 / 12.22 / 29.52 / 0.0 | 18.95 | H / 1.00 / 90 | -27.05 | n/a |
| | | | | | | |
| 315.485 MHz | 34.15 Qp | 1.78 / 13.84 / 29.81 / 0.0 | 19.96 | H / 1.00 / 180 | -26.04 | n/a |
| 323.501 MHz | 37.25 Qp | 1.82 / 14.07 / 29.74 / 0.0 | 23.4 | H / 1.00 / 180 | -22.6 | n/a |
| | | | | | | |
| 315.485 MHz | 34.5 Qp | 1.78 / 13.84 / 29.81 / 0.0 | 20.31 | H / 1.00 / 270 | -25.69 | n/a |

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RADIATED EMISSIONS



America

Test Report #: WC706424 Run 1 Test Area: LTS

EUT Model #: SG8500 Date: 9/21/2007

EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C

Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa

Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %

EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat

Page: 3 of 5

List of measurements for run #: 1

| FREQ | LEVEL (dBuV) | CABLE / ANT / PREAMP / ATTEN (dB) | FINAL (dBuV / m) | POL / HGT / AZ (m)(DEG) | DELTA1 FCC-B <1GHz 3m | DELTA2 |
|---|-----------------|---|---------------------|----------------------------|-----------------------------|--------|
| MAXIMIZED. | | | | | | |
| 323.501 MHz | 40.05 Qp | 1.82 / 14.07 / 29.74 / 0.0 | 26.2 | H / 1.00 / 231 | -19.8 | n/a |
| END OF SCAN < 1GHz. | | | | | | |
| 10.52 GHz | 83.56 Av | 14.47 / 38.28 / 41.57 / 0.0 | 94.74 | V / 1.00 / 0 | n/a | n/a |
| 10.52 GHz | 83.6 Pk | 14.47 / 38.28 / 41.57 / 0.0 | 94.78 | V / 1.00 / 0 | n/a | n/a |
| MAXIMIZED. | | | | | | |
| 10.52 GHz | 60.5 Av | 14.47 / 38.28 / 0.0 / 0.0 | 113.24 | V / 1.00 / 0 | n/a | n/a |
| 10.52 GHz | 60.95 Pk | 14.47 / 38.28 / 0.0 / 0.0 | 113.69 | V / 1.00 / 0 | n/a | n/a |
| NO NEW OR HIGHER EMISSIONS FOUND WITH HORIZONTAL POLARIZATION AT ALL AZIMUTHS 1-100GHz. | | | | | | |
| END OF SCAN 30MHz - 100GHz. | | | | | | |

Tested by: R. M. Johnson

Printed

R. M. Johnson

Signature

Reviewed by: J. T. Schneider

Printed

Joel T. Schneider

Signature

RADIATED EMISSIONS



Test Report #: WC706424 Run 1 Test Area: LTS
 EUT Model #: SG8500 Date: 9/21/2007
 EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C
 Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa
 Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %
 EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat

Page: 4 of 5

Measurement summary for limit1: FCC-B <1GHz 3m (Qp)

| FREQ | LEVEL (dBuV) | CABLE / ANT / PREAMP / ATTEN (dB) | FINAL (dBuV / m) | POL / HGT / AZ (m)(DEG) | DELTA1 FCC-B <1GHz 3m |
|-------------|--------------|-----------------------------------|------------------|-------------------------|-----------------------|
| 48.204 MHz | 44.15 Qp | 0.53 / 14.65 / 29.5 / 0.0 | 29.83 | V / 1.00 / 192 | -10.17 |
| 56.01 MHz | 40.95 Qp | 0.69 / 12.56 / 29.4 / 0.0 | 24.8 | V / 1.00 / 180 | -15.2 |
| 64.272 MHz | 42.55 Qp | 0.76 / 10.8 / 29.4 / 0.0 | 24.71 | V / 1.00 / 270 | -15.29 |
| 118.55 MHz | 43.95 Qp | 0.99 / 9.04 / 29.5 / 0.0 | 24.49 | V / 1.00 / 270 | -19.01 |
| 80.352 MHz | 40.85 Qp | 0.87 / 8.16 / 29.32 / 0.0 | 20.56 | V / 1.00 / 270 | -19.44 |
| 112.507 MHz | 43.05 Qp | 0.98 / 9.44 / 29.5 / 0.0 | 23.96 | V / 1.00 / 180 | -19.54 |
| 72.318 MHz | 39.45 Qp | 0.82 / 9.48 / 29.3 / 0.0 | 20.45 | V / 1.00 / 0 | -19.55 |
| 323.501 MHz | 40.05 Qp | 1.82 / 14.07 / 29.74 / 0.0 | 26.2 | H / 1.00 / 231 | -19.8 |
| 120.548 MHz | 42.65 Qp | 1.0 / 8.91 / 29.5 / 0.0 | 23.06 | V / 1.00 / 90 | -20.44 |
| 116.527 MHz | 42.35 Qp | 0.99 / 9.18 / 29.5 / 0.0 | 23.01 | V / 1.00 / 180 | -20.49 |
| 339.579 MHz | 37.35 Qp | 1.89 / 14.53 / 29.6 / 0.0 | 24.17 | V / 1.00 / 180 | -21.83 |
| 237.099 MHz | 40.0 Qp | 1.45 / 11.58 / 29.54 / 0.0 | 23.5 | V / 1.00 / 180 | -22.5 |
| 122.552 MHz | 40.35 Qp | 1.0 / 8.78 / 29.5 / 0.0 | 20.64 | V / 1.00 / 90 | -22.86 |
| 114.517 MHz | 39.0 Qp | 0.98 / 9.31 / 29.5 / 0.0 | 19.79 | V / 1.00 / 0 | -23.71 |
| 239.109 MHz | 38.55 Qp | 1.46 / 11.64 / 29.51 / 0.0 | 22.14 | V / 1.00 / 180 | -23.86 |
| 136.622 MHz | 38.6 Qp | 1.06 / 9.01 / 29.5 / 0.0 | 19.16 | V / 1.00 / 0 | -24.34 |
| 124.562 MHz | 38.9 Qp | 1.01 / 8.65 / 29.5 / 0.0 | 19.07 | V / 1.00 / 90 | -24.43 |
| 180.83 MHz | 36.25 Qp | 1.29 / 10.17 / 29.49 / 0.0 | 18.22 | V / 1.00 / 90 | -25.28 |
| 315.485 MHz | 34.5 Qp | 1.78 / 13.84 / 29.81 / 0.0 | 20.31 | H / 1.00 / 270 | -25.69 |
| 212.985 MHz | 35.1 Qp | 1.4 / 10.89 / 29.7 / 0.0 | 17.69 | V / 1.00 / 180 | -25.81 |
| 259.209 MHz | 34.75 Qp | 1.5 / 12.22 / 29.52 / 0.0 | 18.95 | H / 1.00 / 90 | -27.05 |
| 221.019 MHz | 35.4 Qp | 1.42 / 11.12 / 29.7 / 0.0 | 18.24 | V / 1.00 / 180 | -27.76 |

Tested by: R. M. Johnson

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RADIATED EMISSIONS



America

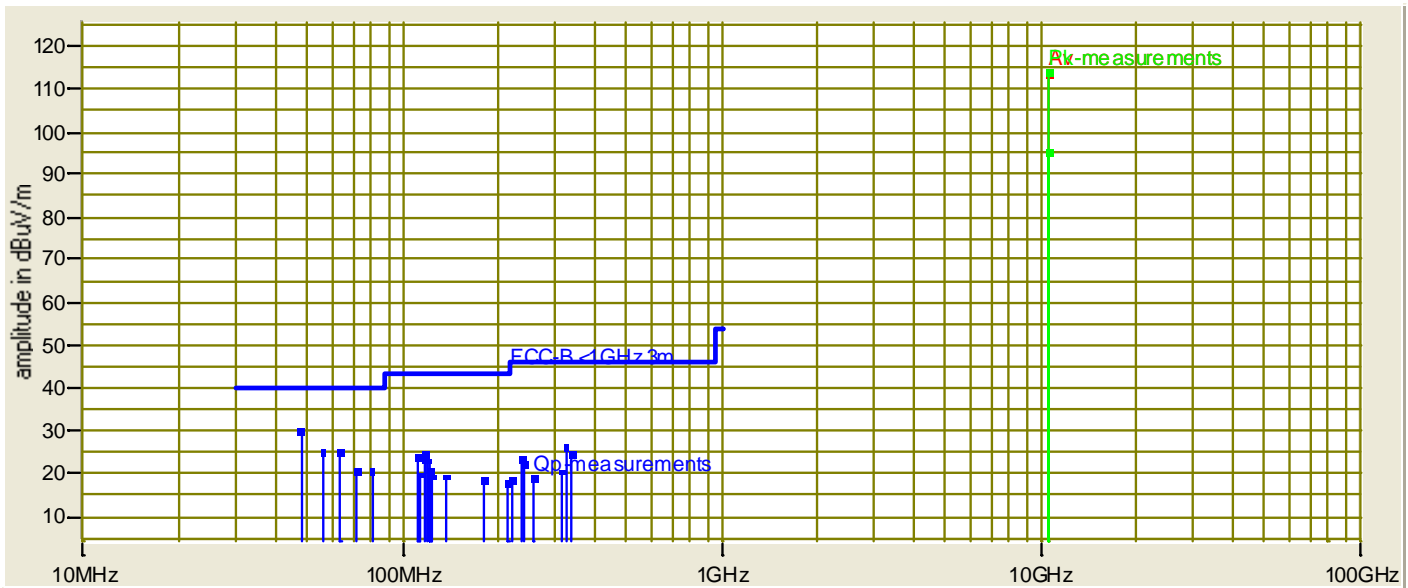
Test Report #: WC706424 Run 1 Test Area: LTS
EUT Model #: SG8500 Date: 9/21/2007
EUT Serial #: A723SH85000106 EUT Power: 60Hz/120VAC Temperature: 21.0 °C
Test Method: FCC 15 - C - Section 15.245 Air Pressure: 97.0 kPa
Customer: LARCO MANUFACTURING Rel. Humidity: 64.0 %
EUT Description: CONTACTLESS SENSOR SWITCH

Notes: _____

Data File Name: 6424.dat

Page: 5 of 5

Graph:



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R. M. Johnson
Signature

Reviewed by: J. T. Schneider
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Joel T. Schneider
Signature

Band Edge Compliance

Specifications:

FCC Specification: Paragraph: 15.245 (b)(3)

IC Specification: RSS-210, Annex 7

The **Band Edge** measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room

Test equipment used :

| TUV ID | Model Number | Manufacturer | Description | Serial Number | Cal Due |
|----------|--------------|---------------------|----------------------------|---------------|-----------|
| ■ - 3294 | 8566B | Hewlett-Packard | Spectrum Analyzer | 2349A03098 | 16-May-08 |
| ■ - 3295 | 85662A | Hewlett-Packard | Analyzer Display | 2349A06144 | 16-May-08 |
| ■ - 2681 | 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2430A00562 | 23-Mar-08 |
| ■ - 3847 | ZHL-1042J | Mini-Circuits | Preamplifier 10 - 3000 MHz | 0607 | Code B |
| ■ - 3958 | SL18B4020 | Phase One Microwave | Preamplifier 1 – 18 GHz | 0002 | Code B |
| 2075 | 3115 | EMCO | Ridge Guide Ant. 1-18 GHz | 9001-3275 | 12-Jan-08 |
| 3294 | 8566B | Hewlett-Packard | Spectrum Analyzer | 2349A03098 | 16-May-08 |

Cal Code B = Calibration verification performed internally.

Cal Code Y = Calibration not required when used with other calibrated equipment.

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

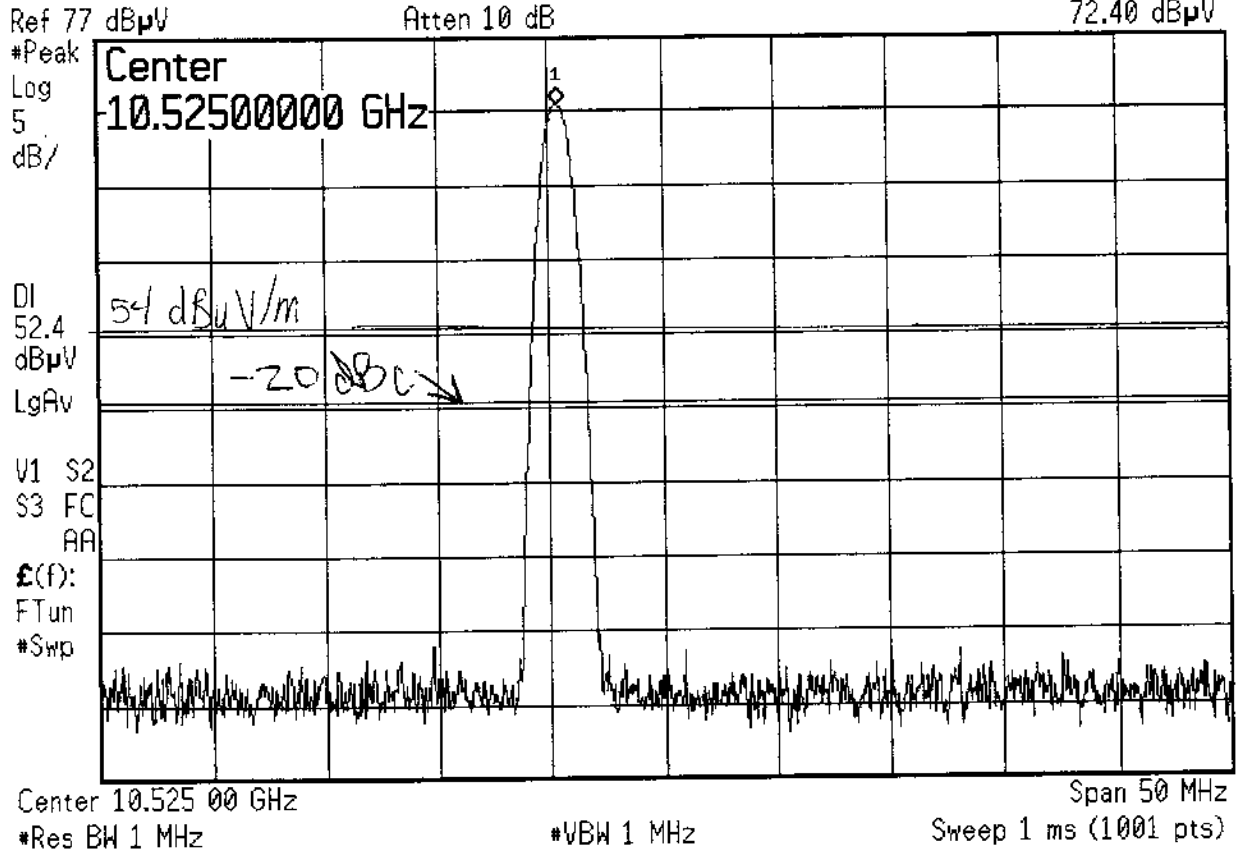
Band Edge Compliance [FCC 15.245 (b)(3)], [RSS-210 Annex 7]

The requirements are

- MET

- NOT MET

Remarks: Allowed band is 10.500 GHz to 10.550 GHz.



BANDEDGE PLOT

FCC-15 C - 15.245

Emission Bandwidth

Specifications:

FCC Specification: N/A

IC Specification: RSS-GEN

The *Emission Bandwidth* measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room

Test equipment used :

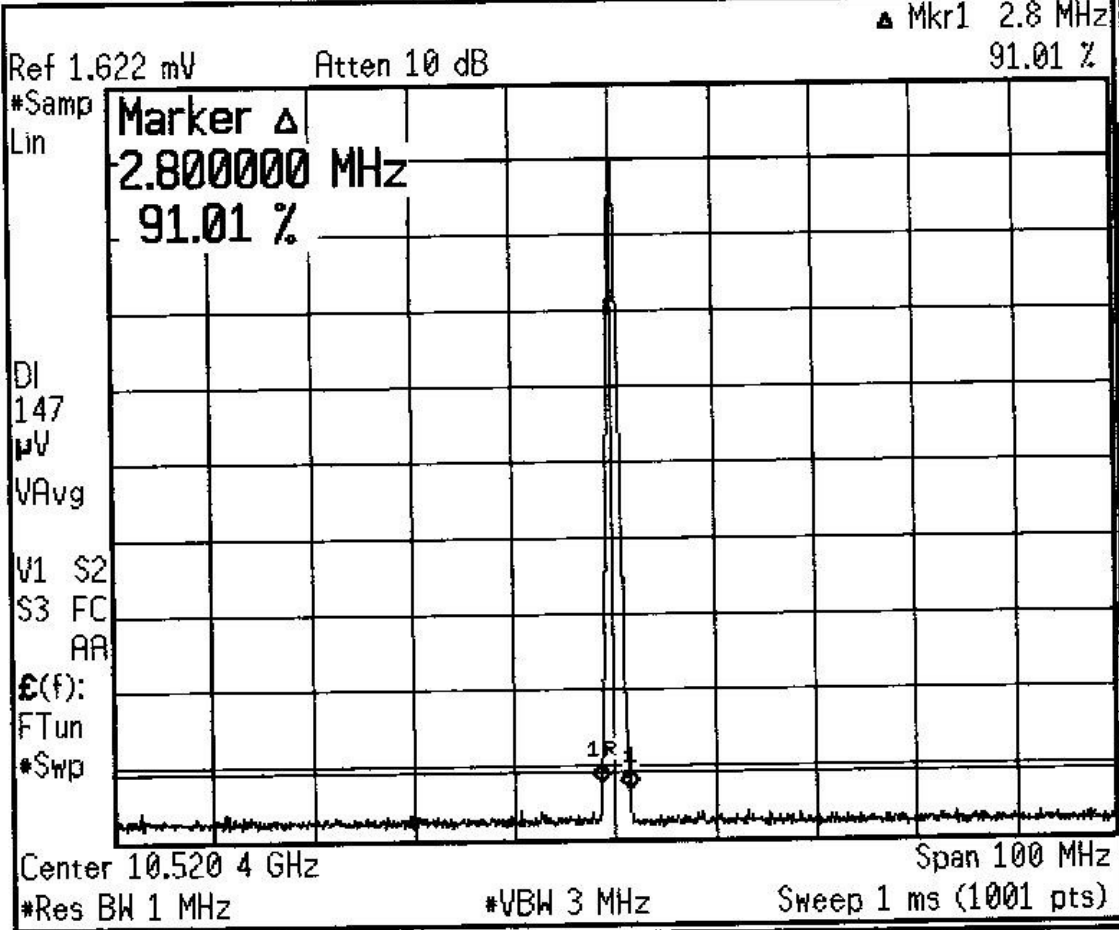
| | TUV ID | Model Number | Manufacturer | Description | Serial Number | Cal Due |
|-----|--------|--------------|---------------------|---------------------------|---------------|-----------|
| ■ - | 3367 | E4440A | Agilent | Spectrum Analyzer | MY42510439 | 14 Oct 07 |
| ■ - | 2075 | 3115 | EMCO | Ridge Guide Ant. 1-18 GHz | 9001-3275 | 12-Jan-08 |
| ■ - | 3958 | SL18B4020 | Phase One Microwave | Preamplifier 1 – 18 GHz | 0002 | Code B |

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

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

99% Bandwidth Plot

Agilent



| | | | |
|------------------------------|--------|---|---|
| Marker | | | |
| Select Marker | | | |
| 1 | 2 | 3 | 4 |
| Normal | | | |
| Delta | | | |
| Delta Pair (Tracking Ref) | | | |
| Ref | ▲ | | |
| Span Pair | | | |
| Span | Center | | |
| Off | | | |
| More | | | |
| 1 of 2 | | | |

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MEASUREMENT PROTOCOL

GENERAL INFORMATION

Environmental conditions in the lab: TUV America Large Test Site

| | <u>Actual</u> |
|----------------------|---------------------------|
| Temperature | : 22 °C |
| Relative Humidity | : 64 % |
| Atmospheric pressure | : 97.0 kPa |
| Power supply system | : 60Hz/120VAC Transformer |

Test Methodology

Conducted and radiated emission testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1993), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1993). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-2001 procedures and using the CISPR 22 Limits.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ± 4.8 dB. The equipment comprising the test systems are 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, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the CISPR limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

RADIATED EMISSIONS

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ V), adding the antenna correction factor and cable loss factor (Factor dB) to it, then subtracting the preamp gain. This result then has the CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment A.

Example:

| FREQ (MHz) | LEVEL (dB μ V) | CABLE/ANT/PREAMP (dB) (dB/m) (dB) | FINAL (dB μ V/m) | POL/HGT/AZ (m) (deg) | DELTA1 EN 55022 A |
|---------------|-----------------------|--------------------------------------|-------------------------|-------------------------|----------------------|
| 60.80 | 42.5Qp | + 1.2 + 10.9 - 25.5 = | 29.1 | V 1.0 0.0 | -10.9 |

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-2001 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 100000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection, 1 MHz rbw/10 Hz vbw to simulate average detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. The transmitter is rotated through 3 orthogonal axes in order to determine the maximum emission levels.

DEVIATIONS FROM STANDARD:

None

GENERAL REMARKS:

SUMMARY:

The requirements according to the technical regulations are

- met

- **not** met.

The device under test does

- fulfill the general approval requirements mentioned on page 3.

- **not** fulfill the general approval requirements mentioned on page 3.

EUT Received Date: 21 September 2007

Condition of EUT: Normal

Testing Start Date: 21 September 2007

Testing End Date: 21 September 2007

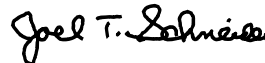
- TÜV PRODUCT SERVICE INC -

Tested By



Ross M Johnson
Senior EMC Technician

Reviewed By



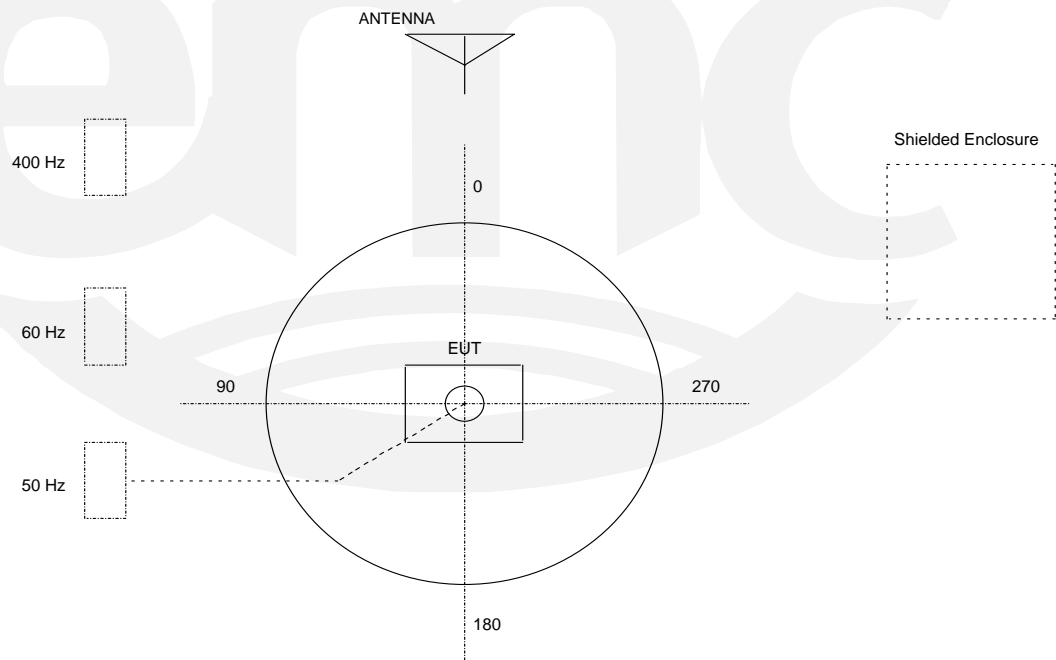
Joel T Schneider
Senior EMC Engineer

TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB Large Test Site

Notes:

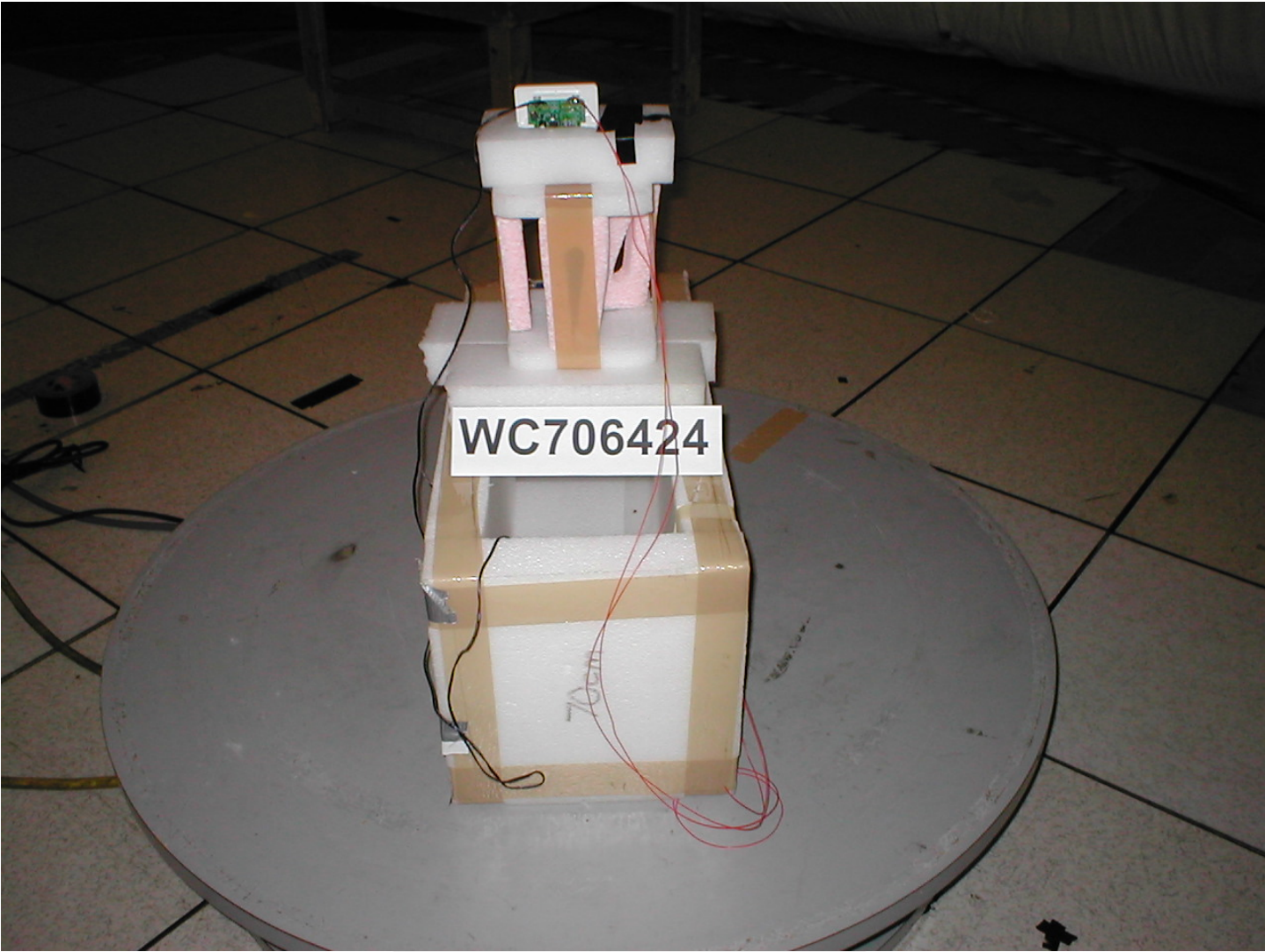
1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.
2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.
3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.
4. The circle is a 6.7 meter diameter turntable.
5. A ground plane is in the plane of this sheet.
6. The test sample is shown in the azimuthal position representing zero degrees.



Radiated Emissions Photos:
Front



Radiated Emissions Photos:
Rear



Conducted Emissions Photos:
(150kHz – 30MHz)



Constructional Data Form(s)

and/or

Product Information Form(s)





EMC Test Plan and Constructional Data Form

America

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, a Division of Atek Companies, Inc.
 Address: 1902 13th St SE
Brainerd, Minnesota 56401
 Contact: Daniel R. 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 Microwave Contactless Switch
 EUT Name _____
 Model No.: 336817 Serial No.: A723SG85000106
 Product Options: none
 Configurations to be tested: maximum sensitivity

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: none
 Modifications made during test: none

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

- | | |
|---|---|
| <input type="checkbox"/> EMC Directive 89/336/EEC (EMC) Std: _____ | <input type="checkbox"/> FCC: Class <input type="checkbox"/> A <input checked="" 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 |
| <input type="checkbox"/> Vehicle Directive 72/245/EEC (EMC) Std: _____ | <input type="checkbox"/> Canada: Class <input type="checkbox"/> A <input checked="" type="checkbox"/> B |
| <input type="checkbox"/> FDA Reviewers Guidance for Premarket Notification Submissions (EMC) | <input type="checkbox"/> Australia: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| | <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 type="checkbox"/> FCC / TCB Certification | <input type="checkbox"/> Industry Canada / FCB Certification |
| <input type="checkbox"/> E-Mark Certification | <input type="checkbox"/> Taiwan Certification |



EMC Test Plan and Constructional Data Form

America

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): _____
- Continue testing to complete test series.
- Continue testing to define corrective action.
- Stop testing.

EUT Specifications and Requirements

Length: 2.5 Width: 2.6 Height: 1.5 Weight: 3oz

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: 12-24 VAC or VDC (If battery powered, make sure battery life is sufficient to complete testing.)

of Phases: 1

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

Other _____

Other Special Requirements

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Power assist doors, low energy doors in businesses, hospitals, clean room environments, etc.

EUT Power Cable

- Permanent OR Removable Length (in meters): _____
- Shielded OR Unshielded
- Not Applicable



EMC Test Plan and Constructional Data Form

America

| 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"/> |
| contact closure output | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | open | | | 2 | <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"/> |



EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level:

Description: normal operating firmware

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.

- 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 # |
|-------------|---------|----------|----------|
| none | | | |



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> |
|--------------------|----------------|-----------------|-----------------|
| none | | | |

Oscillator Frequencies

| <i>Frequency</i> | <i>Derived Frequency</i> | <i>Component # / Location</i> | <i>Description of Use</i> |
|------------------|--------------------------|-------------------------------|---------------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Power Supply

| <i>Manufacturer</i> | <i>Model #</i> | <i>Serial #</i> | <i>Type</i> |
|---------------------|----------------|-----------------|---|
| CUI Stack | DV-1280 | | <input type="checkbox"/> Switched-mode: (Frequency) _____ <input checked="" 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.)

| Description | Manufacturer | Part # or Value | Qty | Component # / Location |
|-------------|--------------|-----------------|-----|------------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

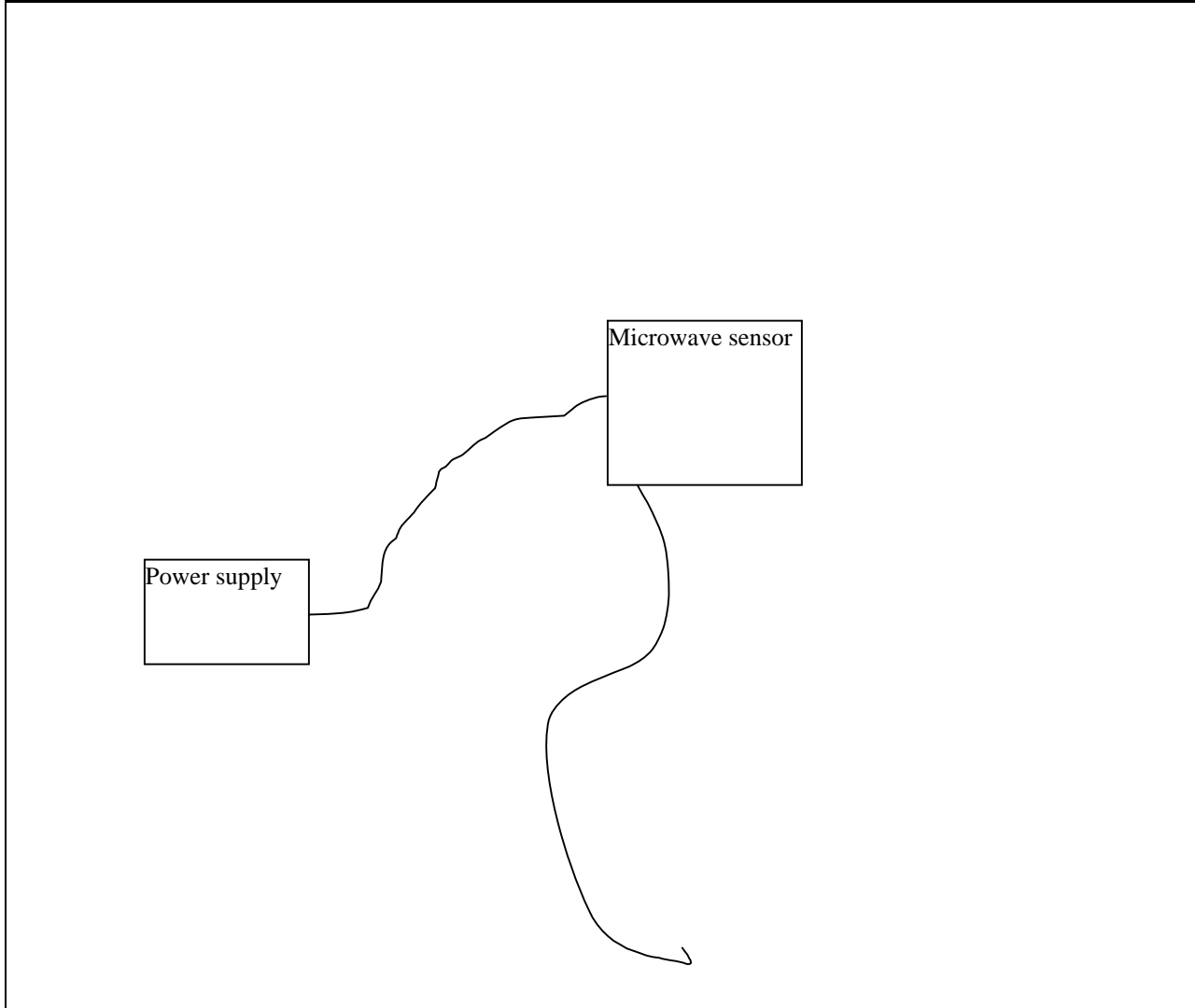
Authorization Signatures (Signature Required for Certifications checked on pg 1)

| | |
|--|------------------|
|  | <p>9/27/2007</p> |
| <p>Customer authorization to perform tests according to this test plan.</p> | <p>Date</p> |
| <p>Daniel R. Pehrson</p> | <p>9/27/2007</p> |
| <p>Test Plan/CDF Prepared By (please print)</p> | <p>Date</p> |



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.



Authorization Signatures

Customer authorization to perform tests according to this test plan.

Daniel R. Pehrson

Test Plan/CDF Prepared By (please print)

Date

September 27, 2007

Date