

Underwriters Laboratories Inc.
1285 Walt Whitman Road
Melville, New York 11747-3081
(631) 271-6200

**Report of Measurements
of Electromagnetic Compatibility Testing**

| | | |
|------------------------|---|--------------------------------|
| Test Report File No. : | NC4085 | Date of issue: January 7, 2002 |
| Applicant : | Hafele | |
| Model / Serial No. : | Locker Lock / | |
| Product Type : | Access controller | |
| Power Supply : | 6VDC Battery operated | |
| Manufacturer : | Same As Applicant | |
| License holder : | Same As Applicant | |
| Address : | 3901 Cheyenne Dr. P.O Box 4000 | |
| | Archdale, NC 27263 | |
| Test Type : | <input checked="" type="checkbox"/> Compliance Investigation <input type="checkbox"/> Manufacturer's Specification | |
| Test Project Number : | 00ME10760 | |
| References(s) | FCC ID: PW3102 | |

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Project Number: 00ME10760
Model Number: Locker Lock

Issued: January 7, 2002

FCC ID: PW3102

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1.0 G E N E R A L - Product Description

The EUT (equipment under test) is a stand-alone device that is utilized to perform as a dead bolt lock. The device operates by using an intentional radio frequency (RF) to a pre-programmed transponder key. The transponder keys are passive devices that take the energy from the magnetic field of the EUT then sends the information stored within it to the EUT.

The EUT operated at an intentional radiation frequency of 134kHz.

The transmitting antenna is not removable.

1.1 Device Configuration During Test

The device under test was configured to continuously transmit the radio frequency of 134kHz.

The device was tested in its normal orientation. All other orientations were examined. The data contained in this report represents the worst case axis.

The device was powered with 4 AA batteries (6VDC) using fresh batteries.

"The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report"

1.2 Deviations from ANSI C63.4

Not Applicable

1.3 Device Modifications Necessary for Compliance

N/A

Environmental conditions in the lab:

| | <u>Range</u> |
|----------------------|-----------------|
| Temperature: | 20-25°C |
| Relative Humidity | 30 - 60 % |
| Atmospheric pressure | 680 - 1060 mbar |

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2.0 EMISSIONS TEST REGULATIONS

FCC Part 15, Subpart C, 15.109 and 15.209

FCC Part 15, Subpart B, Class B

2.1 EUT OPERATION MODE - EMISSIONS TESTS

- Standby
- Test program (H-Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal operation Mode:
- As per manufacturer's instructions: Continuous Operation

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2.1.1 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber)

Test Applicable Test Not Applicable

120kHz – 30MHz using Magnetic loop Antenna

The measurement antenna distance 3 10 meters from the EUT.

30MHz – 1000MHz

The measurement antenna distance 3 10 meters from the EUT.

Tests were performed on the transmitter in accordance with the limitation set forth by CFR47 FCC Part 15 Subpart B, Class B, Paragraphs 15.209 and tested in accordance with the test procedures and methodologies in ANSI C63.4:1992.

The EUT was checked throughout the frequency band 120kHz to 1000MHz. The transmitter operated at 134kHz. The allowable field strength limits in accordance with 15.209 were applied to the fundamental frequency. All other emissions were tested in accordance with the general limitations 15.209.

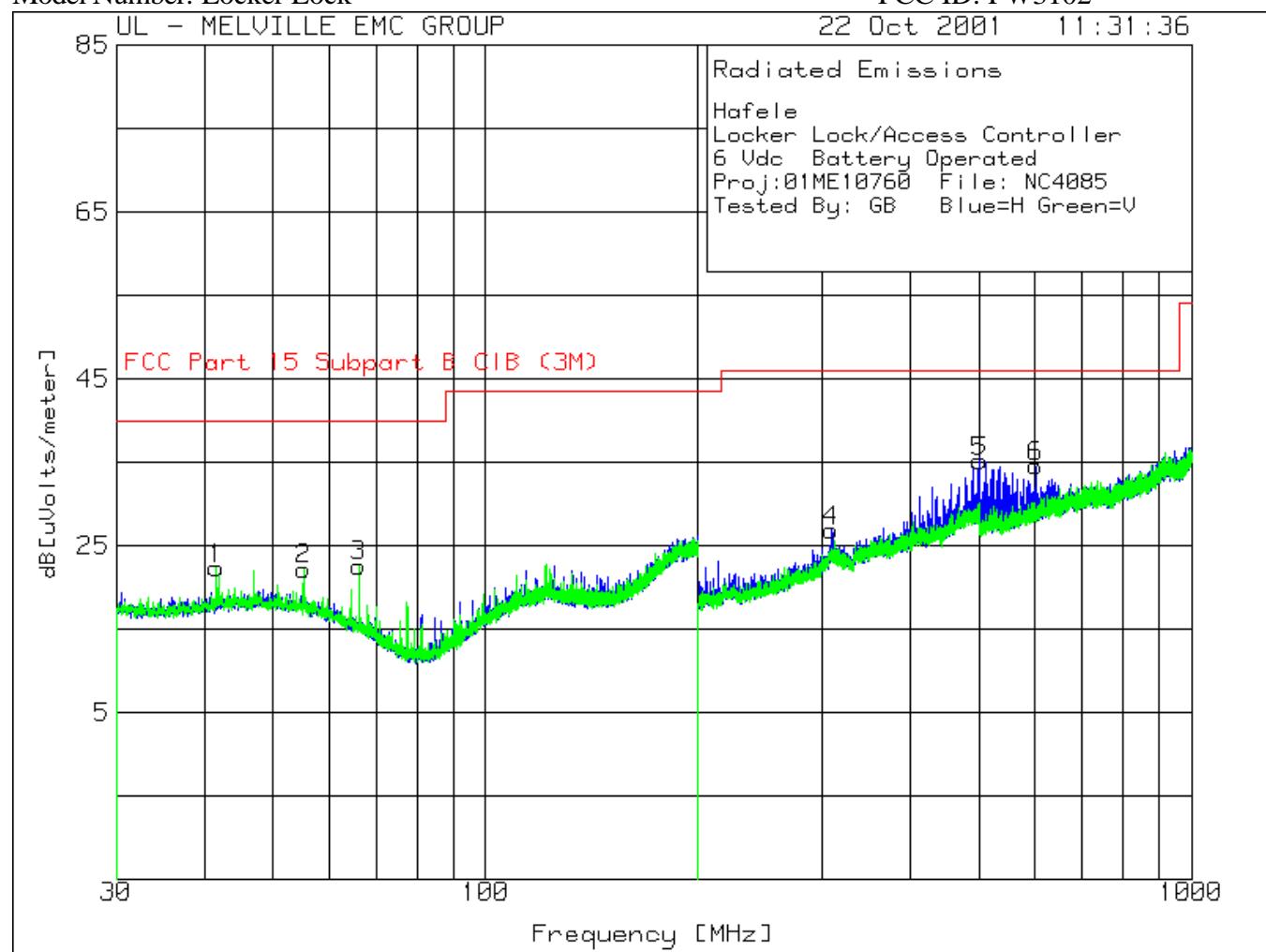
From 120kHz to 30MHz, measurements were made at a distance of 3 meters. The limit was adjusted to a 3-meter limit using the 40dB/decade-limit extrapolation method.

Test equipment used for final radiated emissions tests:

| | | | |
|--|------------------------|---|--------------------------------|
| <input checked="" type="checkbox"/> HP 8574A | Hewlett-Packard | EMI Reciever, | Equipment No.: ME5A-461 |
| Range: .1 – 1000MHz Last Calibration Date: 01-27-01 Calibration Due Date: 01-27-02 | | | |
| Consisting of: | | | |
| | HP - 8566B | Hewlett-Packard Resolution BW: 1MHz Video BW: 1MHz | Spectrum Analyzer, |
| | HP - 85662A | Hewlett-Packard | Analyzer Display |
| | HP - 85650A | Hewlett-Packard BW: 120kHz | Quasi-Peak Adapter, |
| | HP - 85685A | Hewlett-Packard | Preselector |

Test Accessories for Radiated Emissions:

| | | | |
|---|-------------|-----------------------------|-------------------------------|
| <input checked="" type="checkbox"/> 3104C | EMCO | Biconnical Antenna | Equipment No.: ME5-810 |
| Last Calibration Date: 03-16-01 Calibration Due Date: 03-16-02 | | | |
| <input checked="" type="checkbox"/> 3146 | EMCO | Log Periodic Antenna | Equipment No.: ME5-811 |
| Last Calibration Date: 03-07-01 Calibration Due Date: 03-07-02 | | | |
| <input checked="" type="checkbox"/> 6507 | EMCO | Active Loop Antenna | Equipment No.:ME5A-288 |
| Last Calibration Date: 02-01-01 Calibration Due Date: 02-01-02 | | | |



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Hafele
Locker Lock/Access Controller
6 Vdc Battery Operated
Proj:01ME10760 File: NC4085
Tested By: GB Blue=H Green=V

| No. | Frequency [MHz] | Test Reading [dB(uV)] | Meter Factor [dB] | Gain/Loss Transducer Factor [dB] | | Level dB[uVolts/meter] | Limit:1 | 2 | 3 | 4 |
|--------------|--------------------|-----------------------------|-------------------------|---|------|---------------------------|---------|-----|-----|-----|
| | | | | 12.7 | 22.3 | | 40 | N/A | N/A | N/A |
| 1 | 41.5089 | 8.7 pk | .9 | 12.7 | 22.3 | 40 | N/A | N/A | N/A | N/A |
| Azimuth: 89 | Height:99 | Vert | | Margin | [dB] | -17.7 | N/A | N/A | N/A | N/A |
| 2 | 55.1836 | 8.9 pk | 1.1 | 12.2 | 22.2 | 40 | N/A | N/A | N/A | N/A |
| Azimuth: 215 | Height:99 | Vert | | Margin | [dB] | -17.8 | N/A | N/A | N/A | N/A |
| 3 | 66.2253 | 11.7 pk | 1.1 | 9.8 | 22.6 | 40 | N/A | N/A | N/A | N/A |
| Azimuth: 11 | Height:99 | Vert | | Margin | [dB] | -17.4 | N/A | N/A | N/A | N/A |
| 4 | 308.9759 | 8.1 pk | 2.4 | 16.3 | 26.8 | 46 | N/A | N/A | N/A | N/A |
| Azimuth: 325 | Height:201 | Horz | | Margin | [dB] | -19.2 | N/A | N/A | N/A | N/A |
| 5 | 501.3489 | 13.4 pk | 3.5 | 18.2 | 35.1 | 46 | N/A | N/A | N/A | N/A |
| Azimuth: 1 | Height:97 | Horz | | Margin | [dB] | -10.9 | N/A | N/A | N/A | N/A |
| 6 | 601.3988 | 11.4 pk | 3.7 | 19.4 | 34.5 | 46 | N/A | N/A | N/A | N/A |
| Azimuth: 358 | Height:97 | Horz | | Margin | [dB] | -11.5 | N/A | N/A | N/A | N/A |

LIMIT 1: FCC Part 15 Subpart B ClB (3M)

LIMIT 2: NONE

LIMIT 3: NONE

LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
tm - Trace Math Result

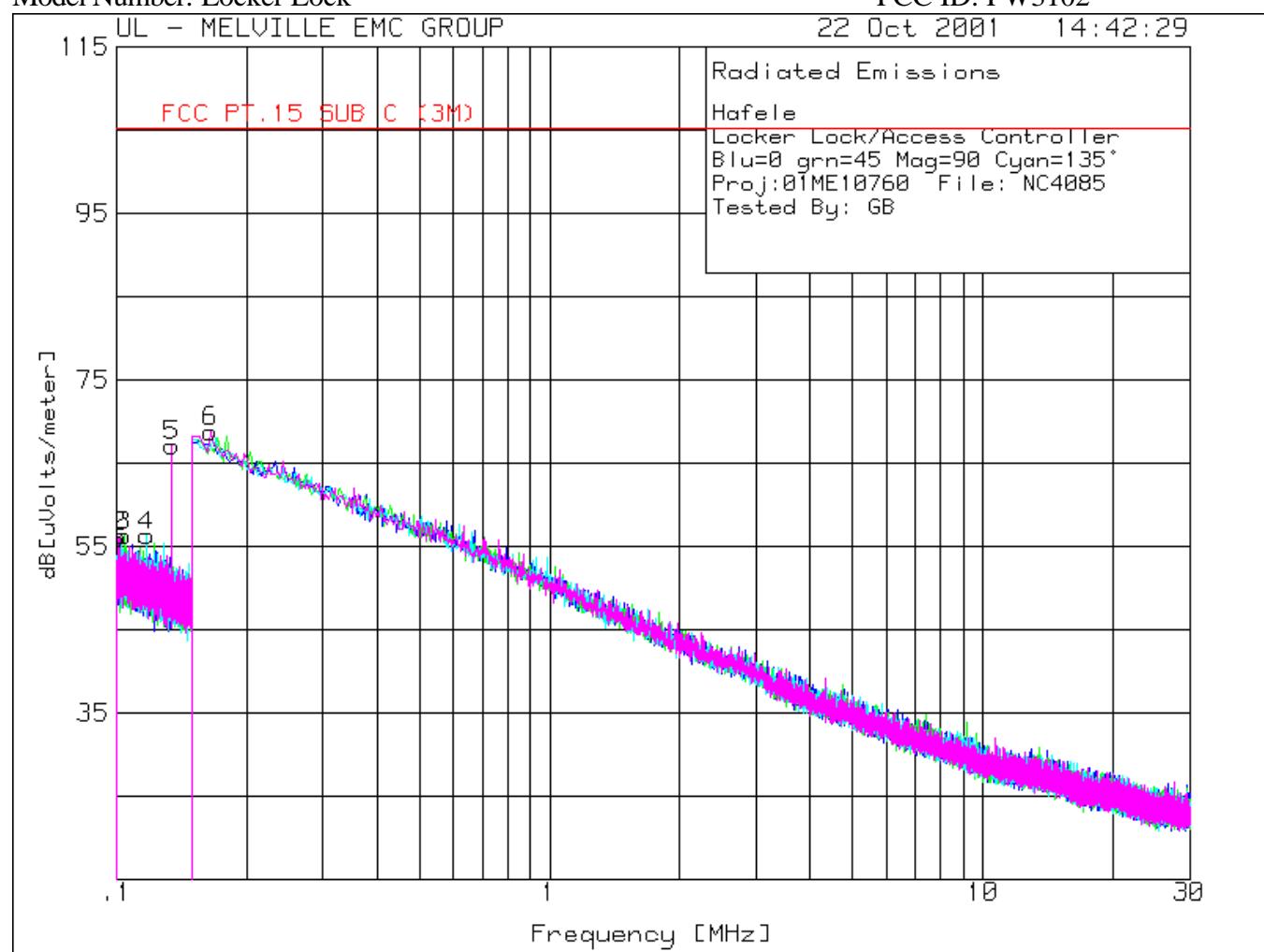
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Radiated Emissions Test 30 – 1000MHz



File Number: NC4085
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FCC ID: PW3102

Hafele
Locker Lock/Access Controller
Blu=0 grn=45 Mag=90 Cyan=135°
Proj:01ME10760 File: NC4085
Tested By: GB

| No. | Test | Meter | Gain/Loss | | Transducer | Level | Limit:1 | 2 | 3 | 4 |
|--------------|------------|----------|-----------|--------|------------|------------------|---------|-----|-----|-----|
| | Frequency | Reading | Factor | Factor | | dB[uVolts/meter] | | | | |
| | [MHz] | [dB(uV)] | [dB] | [dB] | | | | | | |
| 1 | .10069 | 39.5 | pk | .1 | 16.4 | 56 | 105.1 | N/A | N/A | N/A |
| Azimuth: 174 | Height:170 | Horz | | | Margin | [dB] | -49.1 | N/A | N/A | N/A |
| 2 | .10153 | 39.7 | pk | .1 | 16.4 | 56.2 | 105.1 | N/A | N/A | N/A |
| Azimuth: 0 | Height:170 | Horz | | | Margin | [dB] | -48.9 | N/A | N/A | N/A |
| 3 | .10427 | 39.8 | pk | .1 | 16.4 | 56.3 | 105.1 | N/A | N/A | N/A |
| Azimuth: 0 | Height:125 | Horz | | | Margin | [dB] | -48.8 | N/A | N/A | N/A |
| 4 | .11758 | 39.9 | pk | .1 | 16.3 | 56.3 | 105.1 | N/A | N/A | N/A |
| Azimuth: 0 | Height:149 | Horz | | | Margin | [dB] | -48.8 | N/A | N/A | N/A |
| 5 | .13424 | 50.9 | pk | .1 | 16.1 | 67.1 | 105.1 | N/A | N/A | N/A |
| Azimuth: 185 | Height:170 | Horz | | | Margin | [dB] | -38 | N/A | N/A | N/A |
| 6 | .16491 | 52.8 | pk | .1 | 15.9 | 68.8 | 105.1 | N/A | N/A | N/A |
| Azimuth: 0 | Height:170 | Horz | | | Margin | [dB] | -36.3 | N/A | N/A | N/A |

LIMIT 1: FCC PT.15 SUB C (3M)

LIMIT 2: NONE

LIMIT 3: NONE

LIMIT 4: NONE

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

tm - Trace Math Result

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Hafele
Locker Lock/Access Controller
Blu=0 grn=45 Mag=90 Cyan=135°
Proj:01ME10760 File: NC4085
Tested By: GB

| Test | Meter | Gain/Loss | Transducer | Level | Limit:1 | 2 | 3 | 4 |
|-------------|------------|-----------|------------|------------------|---------|-------|-----|-----|
| Frequency | Reading | Factor | Factor | dB[uVolts/meter] | | | | |
| [MHz] | [dB(uV)] | [dB] | [dB] | | | | | |
| .1342 | 44.2 | av | .1 | 16.1 | 60.4 | 105.1 | N/A | N/A |
| Azimuth: 44 | Height:109 | Horz | | Margin [dB] | -44.7 | N/A | N/A | N/A |

=====

LIMIT 1: FCC PT.15 SUB C (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

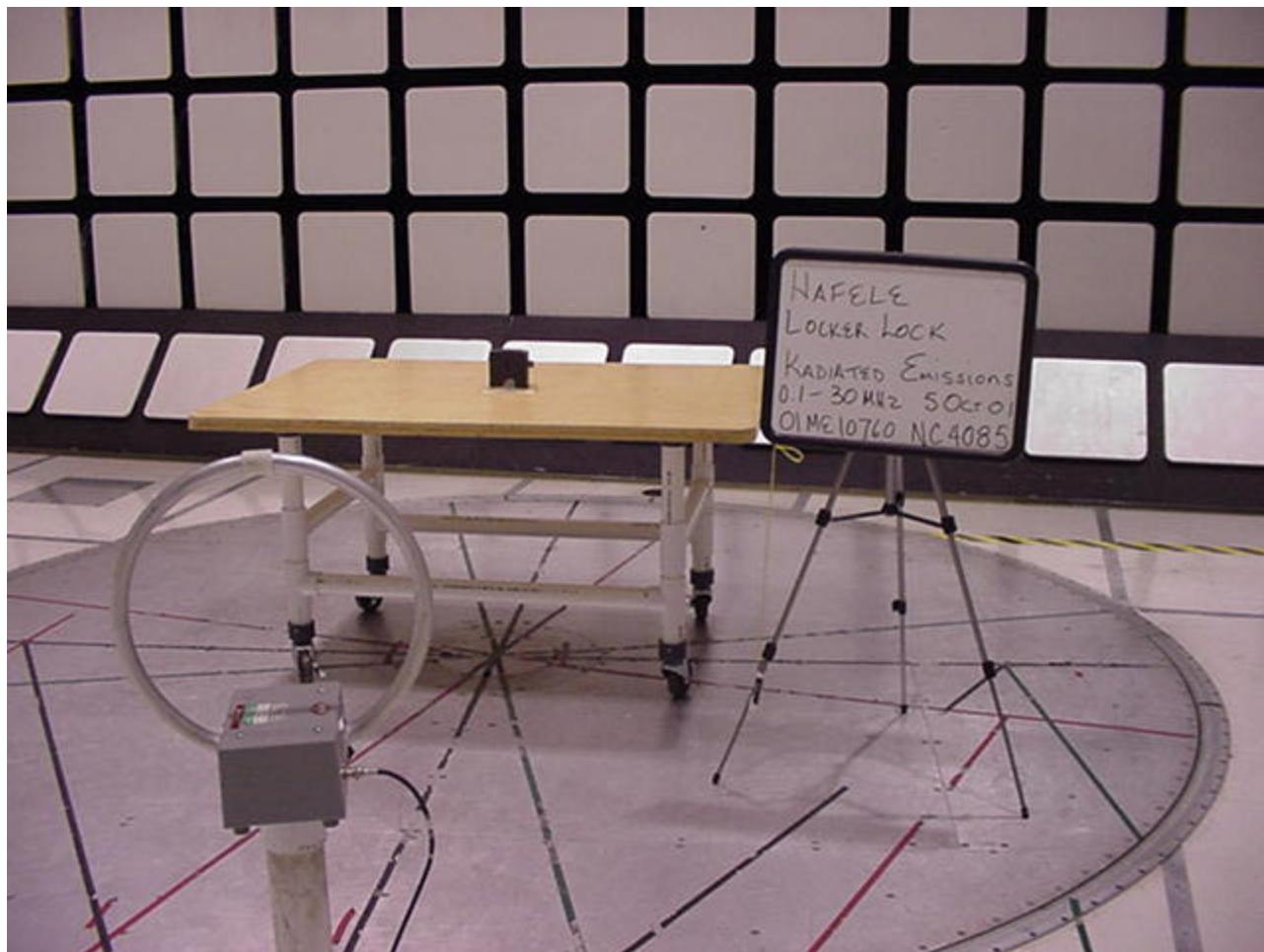
Spectrum Analyzer Settings:

Frequency Span = 0Hz, Resolution Bandwidth = 100kHz, Video Bandwidth = 10Hz

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Radiated Emissions Test 0.1 – 30MHz

3.0 Sample Calculations

Radiated Emissions Limit conversion from $\mu\text{V}/\text{m}$ to $\text{dB}\mu\text{V}/\text{m}$
(Limits in accordance with paragraph 15.109)

Radiated Emissions Limit ($\text{dB}\mu\text{V}/\text{m}$) = $20 * \log (\mu\text{V}/\text{m})$

Radiated Emissions Limit ($\text{dB}\mu\text{V}/\text{m}$) = $20 * \log (90)$

Radiated Emissions Limit ($\text{dB}\mu\text{V}/\text{m}$) = 39.1

Radiated Emissions test data obtained during measurements.

Field Strength ($\text{dB}\mu\text{V}/\text{m}$) = Measured field strength ($\text{dB}\mu\text{V}/\text{m}$) + Antenna Factor (dB) + Cable Factor (dB)

Field Strength ($\text{dB}\mu\text{V}/\text{m}$) = $19.7\text{dB}\mu\text{V}/\text{m} + 12.5\text{dB} + 0.3\text{dB}$

Field Strength ($\text{dB}\mu\text{V}/\text{m}$) = 32.5

Radiated Emissions Limit conversion from $\mu\text{V}/\text{m}$ to $\text{dB}\mu\text{V}/\text{m}$ and 40dB/decade
(Limits in accordance with paragraph 15.209)

Radiated Emission Limits; General Requirements

Frequency between 0.009-0.490 MHz,

$2400/F(\text{kHz})$ at 300 meters = Field Strength in $\mu\text{V}/\text{meter}$

Fundamental Frequency=134kHz

$2400/(134)$ at 300 meters

Radiated emissions at 134 kHz at 300 meters = $17.9\mu\text{V}/\text{meter}$

$\text{dB}\mu\text{V}/\text{m} = 20 * \log (17.9\mu\text{V}/\text{m})$

$\text{dB}\mu\text{V}/\text{m} = 25.05$ at 300meters

Add 40dB/decade

300 meters to 3 meters = 80 dB

Radiated Emissions Limit = $\text{dB}\mu\text{V}/\text{m} + \text{dB}$

$25.05 + 80$

105.05 $\text{dB}\mu\text{V}/\text{m}$

Magnetic field conversion of the active loop antenna:

The magnetic field reading was converted to an electrical field reading by adding the Electric Antenna factors (dB) to the field strength reading. The electric antenna factors are established at the time of the antenna calibration.

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4.0 SUMMARY:

The equipment under test has

met the technical requirements as defined under section(s) 2.0 and 3.0
 not met the technical requirements as defined under section(s) 2.0 and 3.0

Test Start Date: 10-05-01

Test Completion Date: 10-22-01

- UNDERWRITERS LABORATORIES, INC. -

Project Engineer



Donald Lerner (Ext.22765)
Project Engineer
International EMC Services
Conformity Assessment Services-3014AMEL

Reviewer



Robert DeLisi (Ext.22452)
Engineering Group Leader
International EMC Services
Conformity Assessment Services -3014AMEL