



Nemko Test Report: 6L0178RUS1

Applicant: Allflex-Boulder
2820 Wilderness Place, Suite A
Boulder, CO 80301
USA

**Equipment Under Test:
(E.U.T.)** RS320

In Accordance With: **FCC Part 15, Subpart C, Paragraph 15.209**
General Limits For Low Power Transmitters

Tested By: Nemko USA Inc.
802 N. Kealy
Lewisville, TX 75057
USA

Authorized By:

A handwritten signature in blue ink, appearing to read 'Tom Tidwell', written in a cursive style.

Tom Tidwell, Frontline Manager

Date: 22 June, 2006

EQUIPMENT: RS320

Table Of Contents

Section 1. Summary Of Test Results 3

Section 2 General Equipment Specification 5

Section 3. Powerline Conducted Emissions 7

Section 4. Radiated Emissions..... 15

Section 5. Occupied Bandwidth 18

Section 6. Test Equipment List..... 20

ANNEX A TEST DIAGRAMS 21

EQUIPMENT: RS320

Section 1. Summary Of Test Results

Manufacturer: Allflex

Model No.: RS320

Serial No.: 206233999

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

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, Subpart C for low power devices. All tests were conducted using measurement procedure ANSI C63.4-2003. Radiated Emissions were made on an open area test site.

New Submission

Production Unit

Class II Permissive Change

Pre-Production Unit

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

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

See " Summary of Test Data".



NVLAP LAB CODE: 100426-0

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This report applies only to the items tested.

EQUIPMENT: RS320

Summary Of Test Data

| NAME OF TEST | PARA. NO. | RESULT |
|-------------------------------|------------------|---------------|
| Powerline Conducted Emissions | 15.207 | Complies |
| Radiated Emissions | 15.209 | Complies |
| Occupied Bandwidth | Not Specified | NA |

EQUIPMENT: RS320

Section 2. General Equipment Specification

Frequency Range: 134.2 Fixed
Operating Frequency(ies) of Sample: 134.2 kHz
20 dB Bandwidth 3.84 kHz

Integral Antenna

Yes

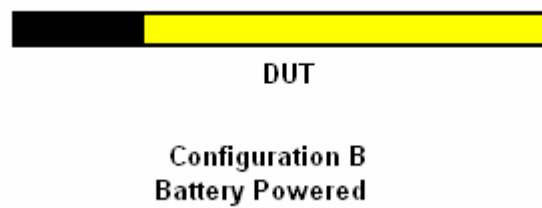
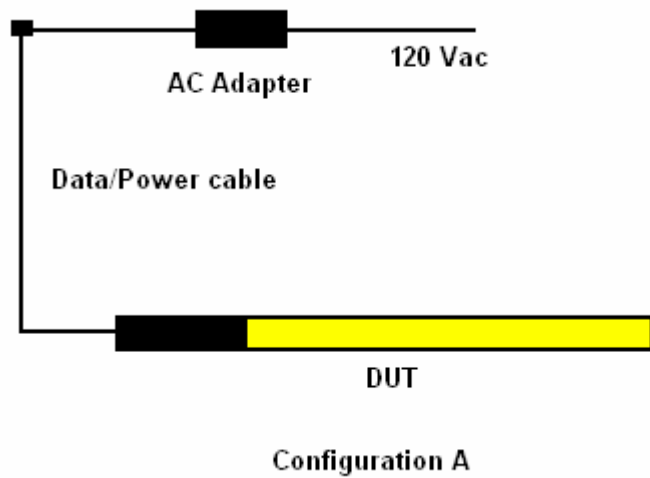
No

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Description of DUT

Hand held RFID reader

System Diagram



EQUIPMENT: RS320

Section 3. Powerline Conducted Emissions

| | |
|---|--------------------|
| NAME OF TEST: Powerline Conducted Emissions | PARA. NO.: 15.207 |
| TESTED BY: David Light | DATE: 20 June 2006 |

Test Results: Complies. The worst-case emission level is 62.8 dBμV at 0.150 MHz on the hot side of the line. This is 3.2 dB below the quasi-peak specification limit of 66 dBμV.

Minimum Standard: §15.207 Conducted limits.

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 mH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency of Conducted Emission (MHz) | Limit (dBmV) | |
|---------------------------------------|--------------|-----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* Decreases with the logarithm of the frequency.

Measurement Data: See attached graph(s).

Method of Measurement: (Procedure ANSI C63.4-2003)

Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak Detector. Any emissions that are close to the limit are measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak Detector.

Test equipment used: 1659-2075-1547-1258-1433-674

Environmental Conditions: 22°C
 35% RH

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Test Data – Powerline Conducted Emissions

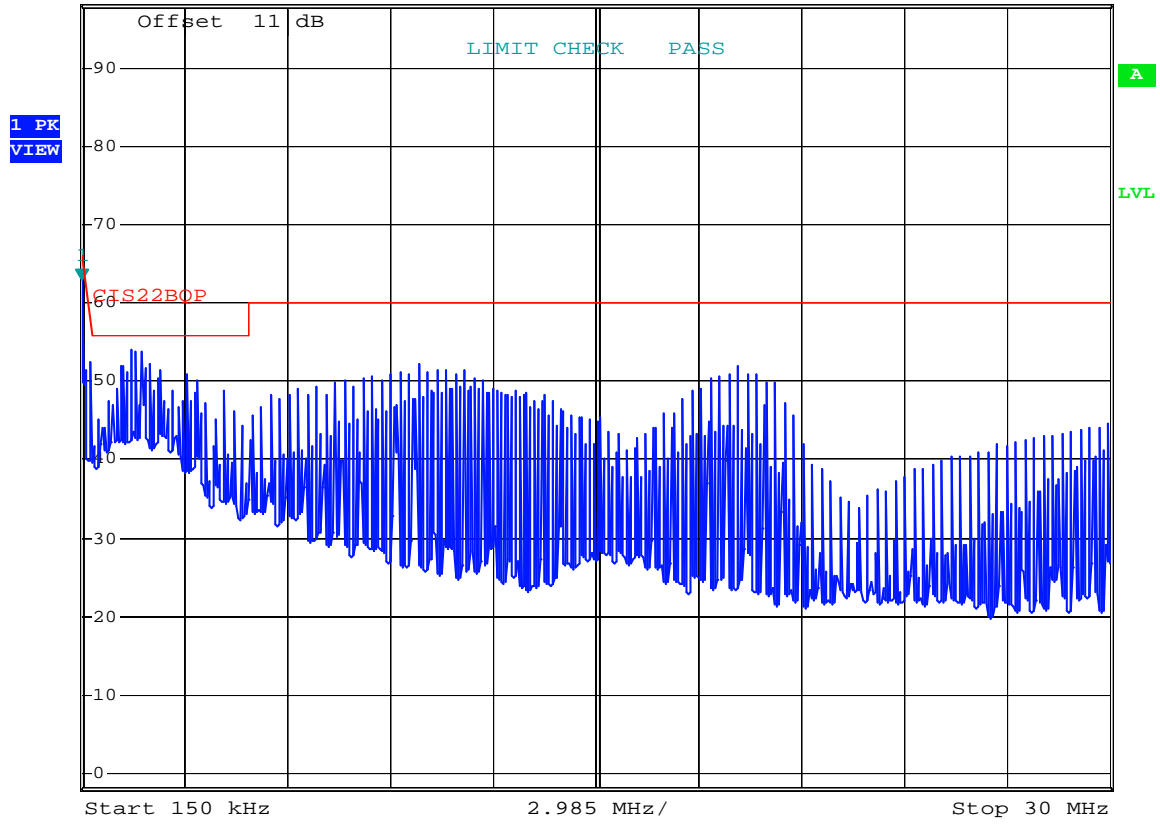
L1
PEAK



*RBW 10 kHz Marker 1 [T1]
VBW 30 kHz 62.93 dBμV
SWT 300 ms 150.00000000 kHz

Ref 98 dBμV

Att 10 dB



Date: 20.JUN.2006 10:58:31

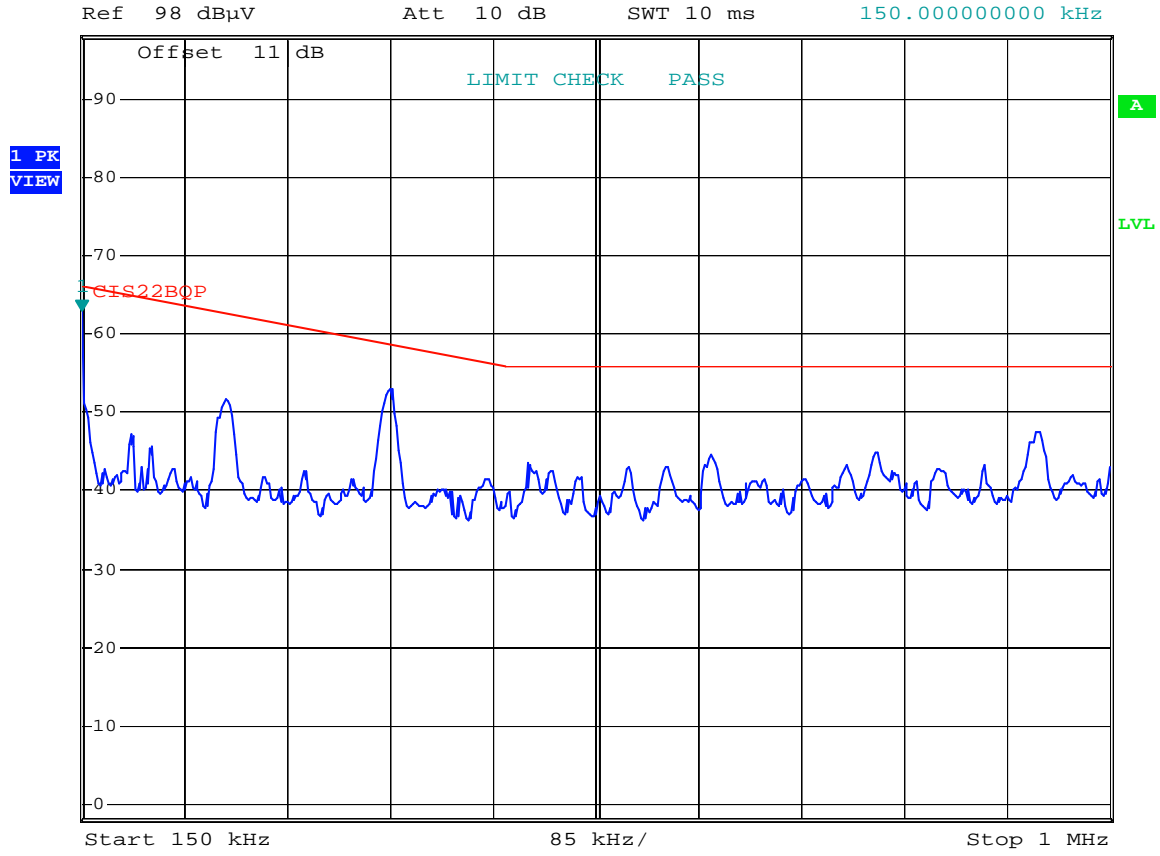
EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

L1
PEAK



*RBW 10 kHz Marker 1 [T1]
VBW 30 kHz 62.92 dBµV
SWT 10 ms 150.00000000 kHz



Date: 20.JUN.2006 10:59:30

EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

L1

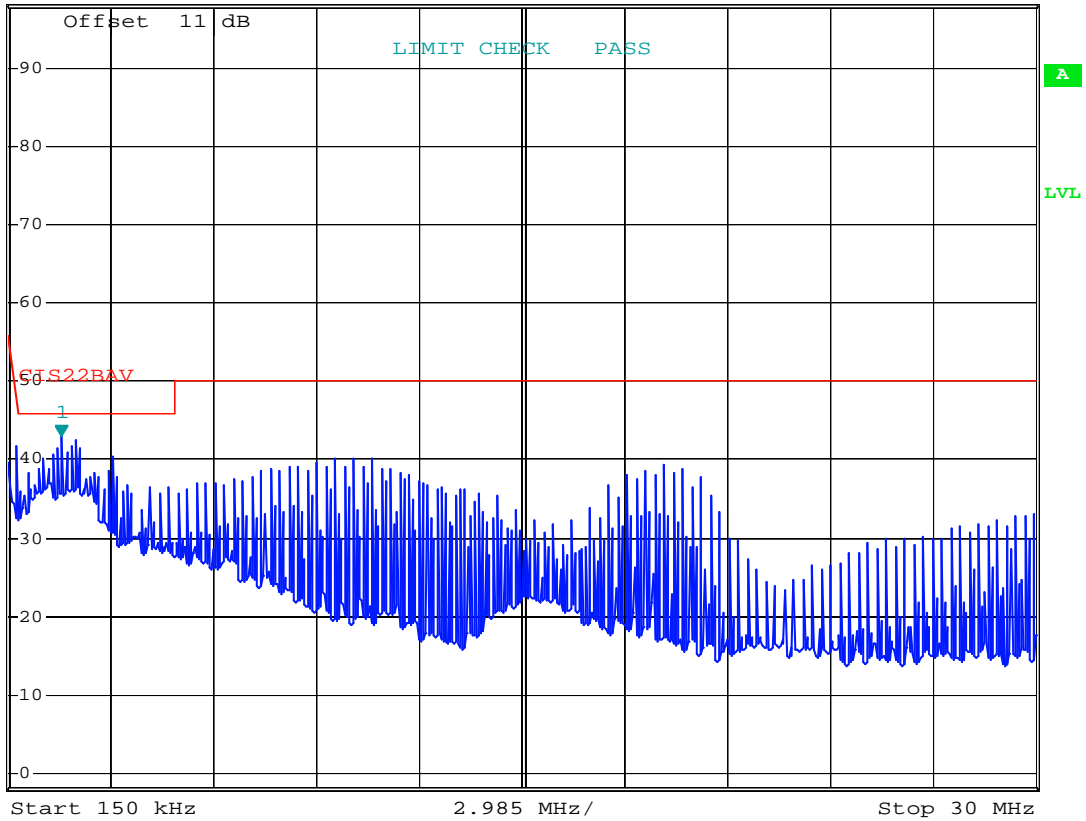
AVERAGE



MARKER 1
1.7022 MHz
Ref 98 dBµV Att 10 dB

*RBW 10 kHz Marker 1 [T1]
VBW 100 kHz 42.96 dBµV
SWT 300 ms 1.70220000 MHz

L AV
VIEW



Date: 20.JUN.2006 11:00:34

EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

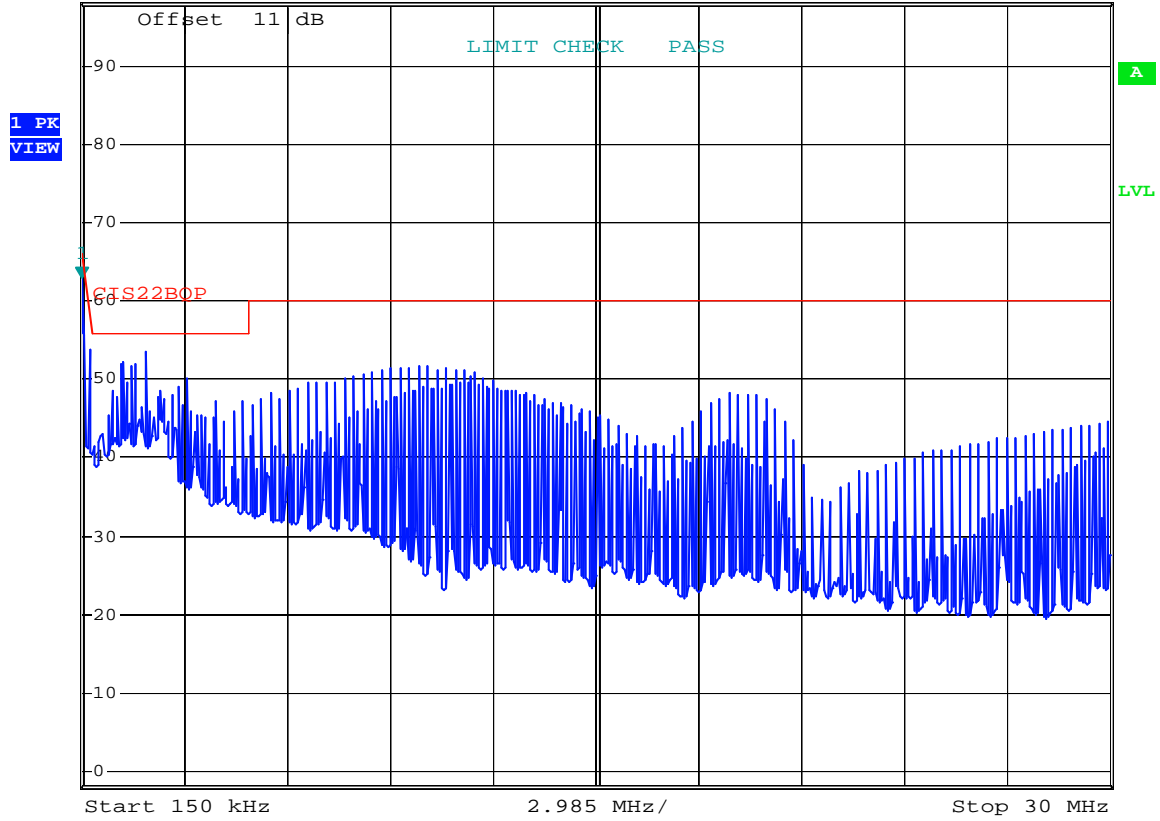
L2

PEAK



MARKER 1
150 kHz
Ref 98 dBµV Att 10 dB

*RBW 10 kHz Marker 1 [T1]
VBW 30 kHz 62.93 dBµV
SWT 300 ms 150.00000000 kHz



Date: 20.JUN.2006 11:03:59

EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

L2

PEAK

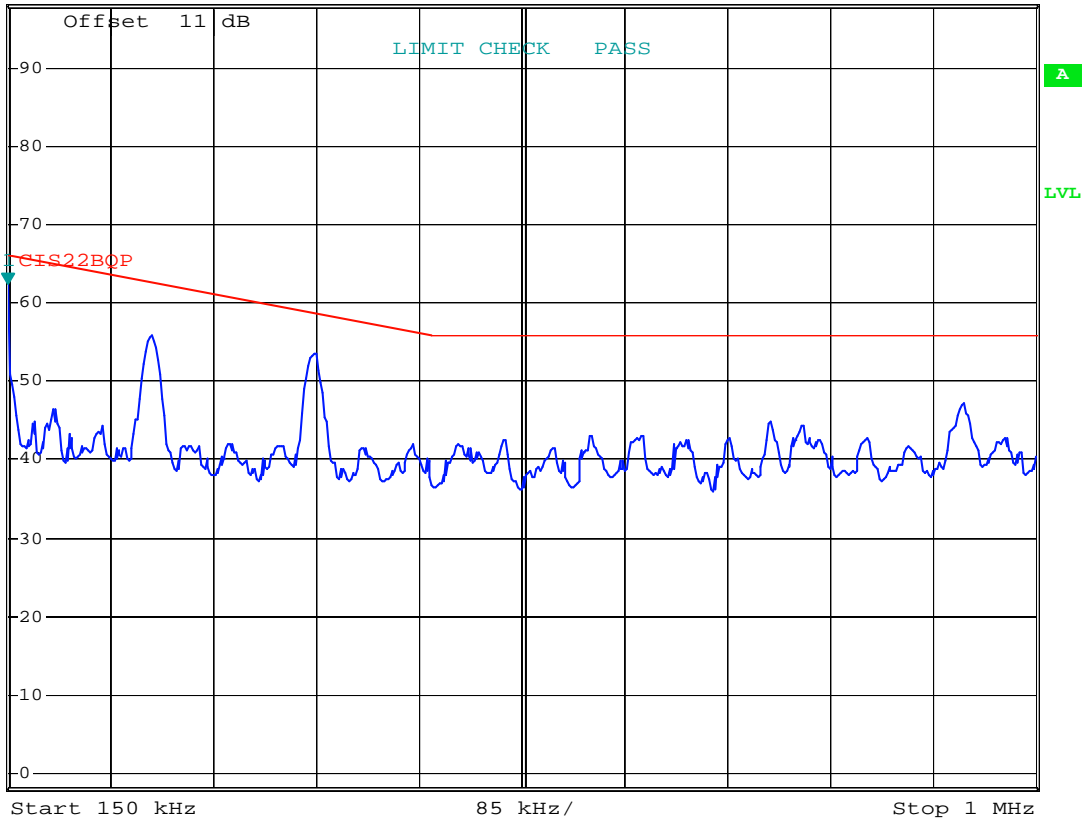


*RBW 10 kHz Marker 1 [T1]
VBW 30 kHz 62.34 dBµV
SWT 10 ms 150.00000000 kHz

Ref 98 dBµV

Att 10 dB

1 PK
VIEW



Date: 20.JUN.2006 11:04:38

EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

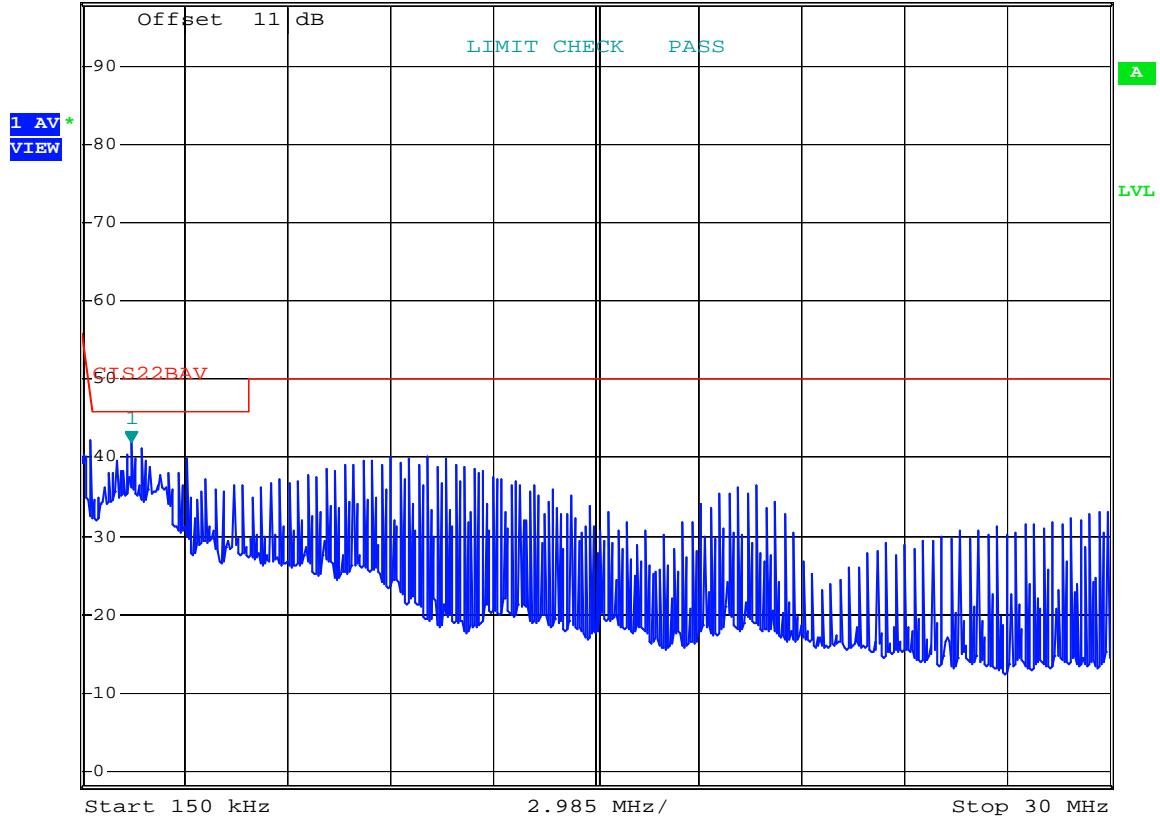
L2

AVERAGE



MARKER 1
1.5828 MHz
Ref 98 dBµV Att 10 dB

*RBW 10 kHz Marker 1 [T1]
VBW 100 kHz 42.04 dBµV
SWT 300 ms 1.582800000 MHz



Date: 20.JUN.2006 11:02:48

EQUIPMENT: RS320

Powerline Conducted Photographs



EQUIPMENT: RS320

Section 4. Radiated Emissions

| | |
|----------------------------------|--------------------|
| NAME OF TEST: Radiated Emissions | PARA. NO.: 15.209 |
| TESTED BY: David Light | DATE: 20 June 2006 |

Minimum Standard: The field strength of emissions from the device shall not exceed the following limits.

| Fundamental (MHz) | Field Strength (µV/m) | Field Strength (dBµV) |
|-------------------|-----------------------|-----------------------|
| 0.009 - 0.490 | 2400/F(kHz) @ 300m | — |
| 0.490 - 1.705 | 24000/F(kHz) @ 30m | — |
| 1.705 - 30 | 30 @ 30m | — |
| 30 - 88 | 100 | 40.0 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46.0 |
| Above 960 | 500 | 54.0 |

Test Results: Complies. The worst-case emission level is dBµV/m @ 3m at MHz. This is dB below the specification limit.

Measurement Data: (Procedure ANSI C63.4-2003)

Maximizing Emission Levels:

For hand held equipment or equipment that may be mounted in a variety of positions, the E.U.T. was tested on three orthogonal axis to determine orientation of worst-case emission levels. Below 30 MHz an active loop antenna is used at a fixed height of 1 meter. The loop is rotated about it's vertical axis to obtain worst-case results.

Spectrum Searched:

The spectrum was searched from the lowest frequency generated in the E.U.T. up to 1000 MHz, or the 10th harmonic of the fundamental emission.

Near-Field Measurement:

Emissions below 30 MHz are measured in the near-field and an extrapolation factor of 40 dB per decade is used to determine the 10m limit.

Example: Measurement Distance = 10m
 Specification Distance = 300m

10m Limit: Specified limit (at 300m) - $(40 \text{ Log } \frac{10}{300})$

Thus for measurement at 10m the specified limit is increased by 59 dB.

EQUIPMENT: RS320

Test Data - Radiated Emissions

| Radiated Emissions Data | | | | | | | | | | | |
|-------------------------|--|------------------|-----------------------|--|-----------------|-----------------|-------------------------|--|--|--|--|
| Complete | <u> X </u> | | Job # : <u>6L0178</u> | | | | Test # : <u>REHE-01</u> | | | | |
| Preliminary | <u> </u> | | Page <u> 1 </u> | | | | of <u> 1 </u> | | | | |
| EUT Model # : | <u>RS320</u> | | | | | | | | | | |
| EUT Part # : | <u>930032-001-B</u> | | | | | | | | | | |
| EUT Serial # : | <u>206233999</u> | | | | | | | | | | |
| EUT Config. : | <u>Tx AC Powered and Battery powered</u> | | | | | | | | | | |
| Specification : | <u>15.209</u> | | | | | Reference : | | | | | |
| Loop Ant. # : | <u>1140</u> | Temp. (deg. C) : | <u>22</u> | | Date : | <u>06/20/06</u> | | | | | |
| Bicon Ant.#: | <u> </u> | Humidity (%) : | <u>40</u> | | Time : | <u>9:00</u> | | | | | |
| Log Ant.#: | <u> </u> | | | | Staff : | <u>D. Light</u> | | | | | |
| Bilog Ant.#: | <u> </u> | | | | Photo ID: | <u>NA</u> | | | | | |
| Dipole Ant.#: | <u> </u> | | | | Peak Bandwidth: | <u>10 kHz</u> | | | | | |
| Cable#: | <u>2075</u> | Distance: | <u>3 m</u> | | Video Bandwidth | <u>10 kHz</u> | | | | | |
| Preamp#: | <u> </u> | | | | | | | | | | |
| Limiter#: | <u>na</u> | | | | | | | | | | |
| Atten #: | <u>na</u> | | | | | | | | | | |
| Detector#: | <u>1036</u> | | | | | | | | | | |

| Meas. Freq. (kHz) | Ant. Pol. (H/V) | Atten. (dB) | Meter Reading (dBuV) | Antenna Factor (dB) | Path Loss (dB) | RF Gain (dB) | Corrected Reading (dBuV/m) | Spec. limit (dBuV/m) | CR/SL Diff. (dB) | Pass Fail Unc. | QP readings Comment |
|-------------------|-----------------|-------------|----------------------|---------------------|----------------|--------------|----------------------------|----------------------|------------------|----------------|---------------------|
| | | | | | | | | | | | Battery Powered |
| 134.2 | Loop | 0 | 62.6 | 3.6 | 1.0 | 0.0 | 67.2 | 105.0 | -37.8 | Pass | Carrier |
| 268.4 | Loop | 0 | 17.8 | 0 | 1.0 | 0.0 | 18.8 | 99.0 | -80.2 | Pass | |
| 402.6 | Loop | 0 | 25 | -4.2 | 1.0 | 0.0 | 21.8 | 95.5 | -73.7 | Pass | |
| 536.8 | Loop | 0 | 23.7 | -6.1 | 1.0 | 0.0 | 18.6 | 73.0 | -54.4 | Pass | |
| 939.4 | Loop | 0 | 18.4 | -12 | 1.0 | 0.0 | 7.4 | 68.0 | -60.6 | Pass | |
| | | | | | | | | | | | AC Powered |
| 134.2 | Loop | 0 | 64 | 3.6 | 1.0 | 0.0 | 68.6 | 105.0 | -36.4 | Pass | Carrier |
| 268.4 | Loop | 0 | 16 | 0 | 1.0 | 0.0 | 17.0 | 99.0 | -82.0 | Pass | |
| 402.6 | Loop | 0 | 28 | -4.2 | 1.0 | 0.0 | 24.8 | 95.5 | -70.7 | Pass | |
| 536.8 | Loop | 0 | 24 | -6.1 | 1.0 | 0.0 | 18.9 | 73.0 | -54.1 | Pass | |
| 939.4 | Loop | 0 | 19.3 | -12 | 1.0 | 0.0 | 8.3 | 68.0 | -59.7 | Pass | |

Searched spectrum 9 kHz to 1.5 MHz (10th Harmonic) - No emissions were detected within 20 dB of specification.

The input power was varied +/- 15% with no effect on output power.

The device was tested with fresh batteries.

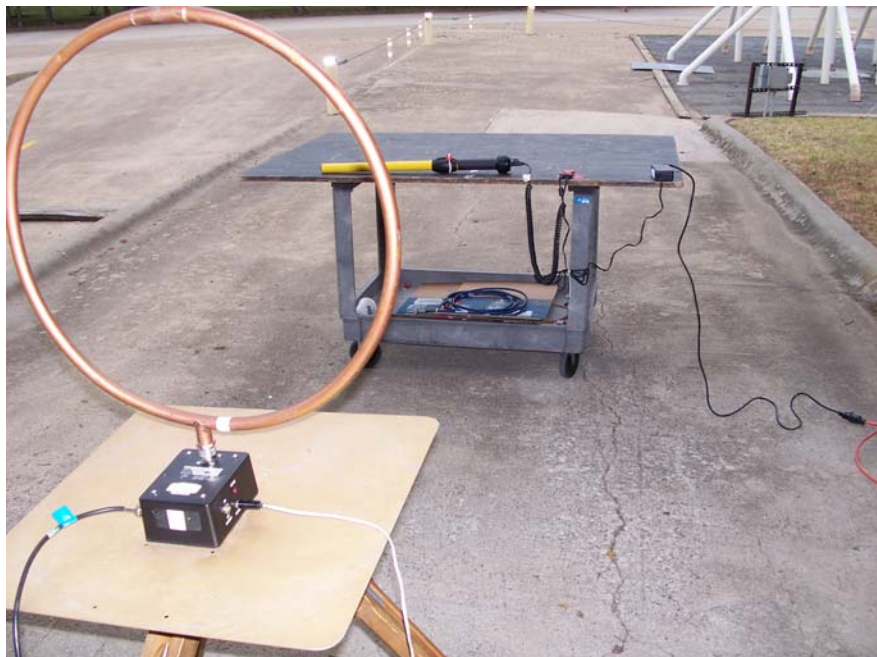
The device was tested on three orthogonal axis'.

EQUIPMENT: RS320

Radiated Photographs (Worst Case Configuration)



Battery Powered



AC Powered

EQUIPMENT: RS320

Section 5. Occupied Bandwidth

| | |
|----------------------------------|--------------------|
| NAME OF TEST: Occupied Bandwidth | PARA. NO.: N/A |
| TESTED BY: David Light | DATE: 20 June 2006 |

Minimum Standard: Not specified.

Test Results: The 99% power occupied bandwidth is 3.84 kHz.

Measurement Data: See attached graph(s).

Method of Measurement:

A spectrum analyzer was used to measure the 99% power occupied bandwidth of the fundamental emission. This value is used as the bandwidth for the emission designator.

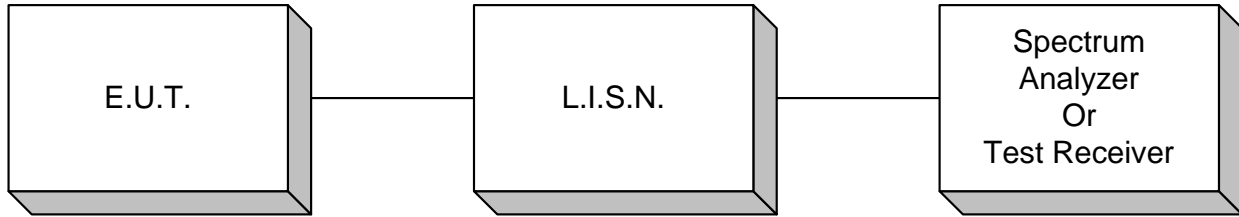
*EQUIPMENT: RS320***Section 6. Test Equipment List**

| Nemko ID | Description | Manufacturer Model Number | Serial Number | Calibration Date | Calibration Due |
|----------|---------------------|------------------------------|---------------|---------------------|--------------------|
| 1659 | Spectrum Analyzer | Rhode & Schwarz FSP | 973353 | 01/10/06 | 01/10/07 |
| 2074 | Cable | Nemko USA, Inc. None | None | 08/10/05 | 08/10/06 |
| 1258 | LISN .15mhz-30mhz | EMCO 0 | 1305 | 04/19/06 | 04/19/07 |
| 1433 | High pass filter | Solar 7930-5.0 | 933142 | 09/07/05 | 09/07/06 |
| 674 | LIMITER | HP 11947A | 3107A02200 | 04/19/06 | 04/19/07 |
| 1036 | SPECTRUM ANALYZER | ROHDE & SCHWARZ FSEK30 | 830844/006 | 05/26/06 | 05/26/08 |
| 1140 | ACTIVE LOOP ANTENNA | A.H. SYSTEMS SAS-200/562B | 213 | 03/09/06 | 03/09/08 |
| 1547 | CABLE .6m | Nemko USA, Inc. RG223 | N/A | 03/09/06 | 03/09/07 |

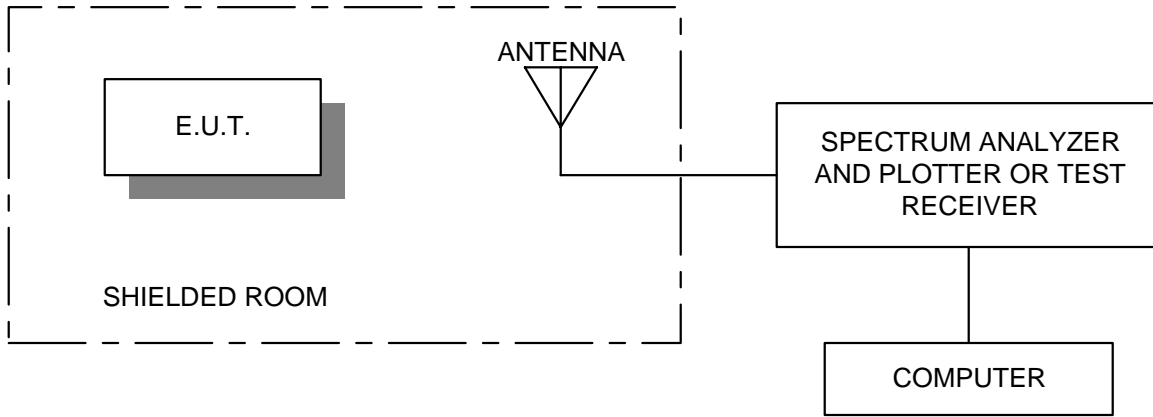
ANNEX A
TEST DIAGRAMS

EQUIPMENT: RS320

Conducted Emissions



Radiated Prescan



Test Site For Radiated Emissions

