



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', is written over a light blue horizontal line.

Tom Tidwell, Frontline Manager

Date: 22 June, 2006

EQUIPMENT: RS320

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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

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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

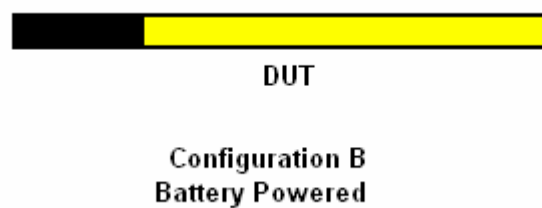
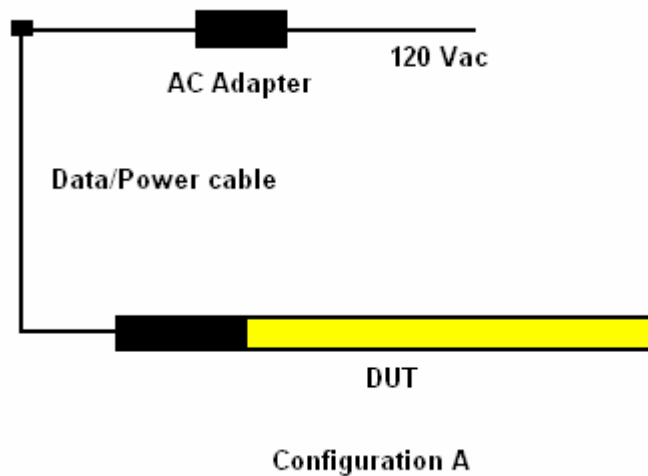
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Description of DUT

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 dB μ V at 0.150 MHz on the hot side of the line. This is 3.2 dB below the quasi-peak specification limit of 66 dB μ V.

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

EQUIPMENT: RS320

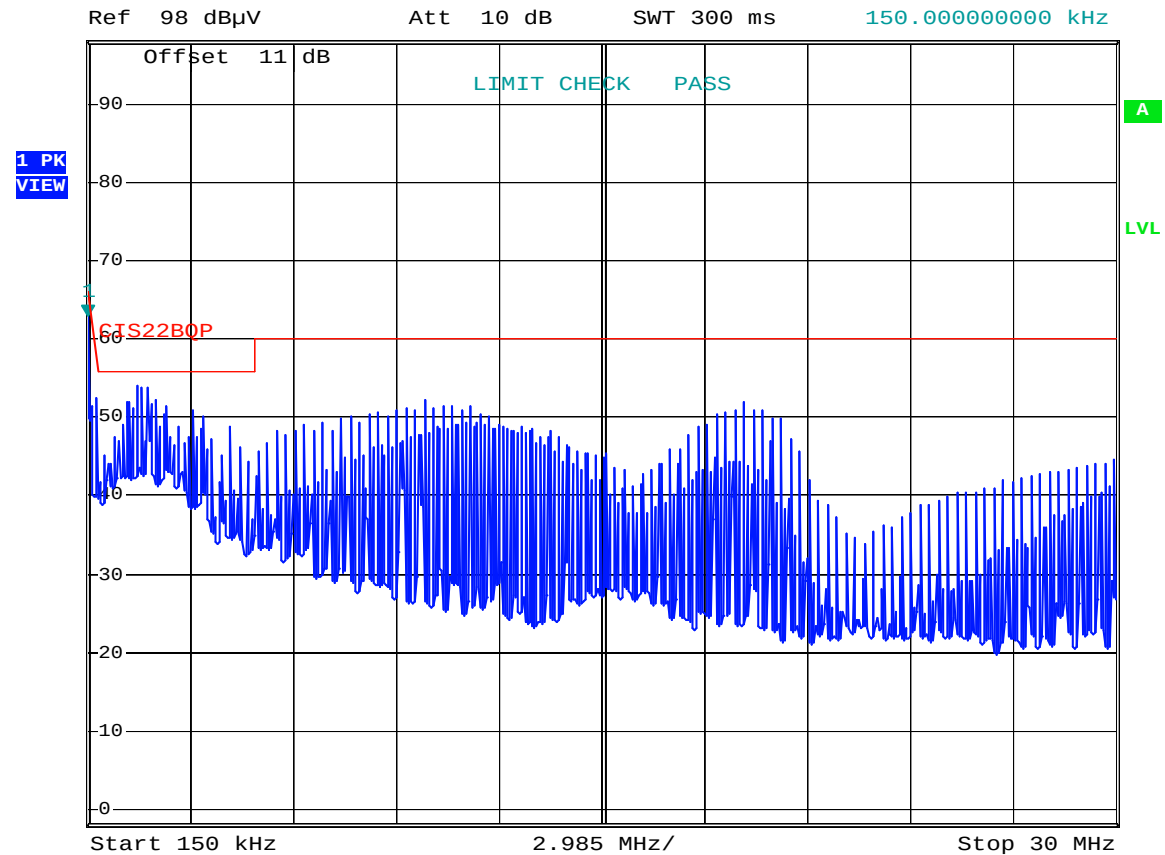
Test Data – Powerline Conducted Emissions

L1

PEAK



*RBW 10 kHz Marker 1 [T1]
VBW 30 kHz 62.93 dBμV
SWT 300 ms 150.000000000 kHz



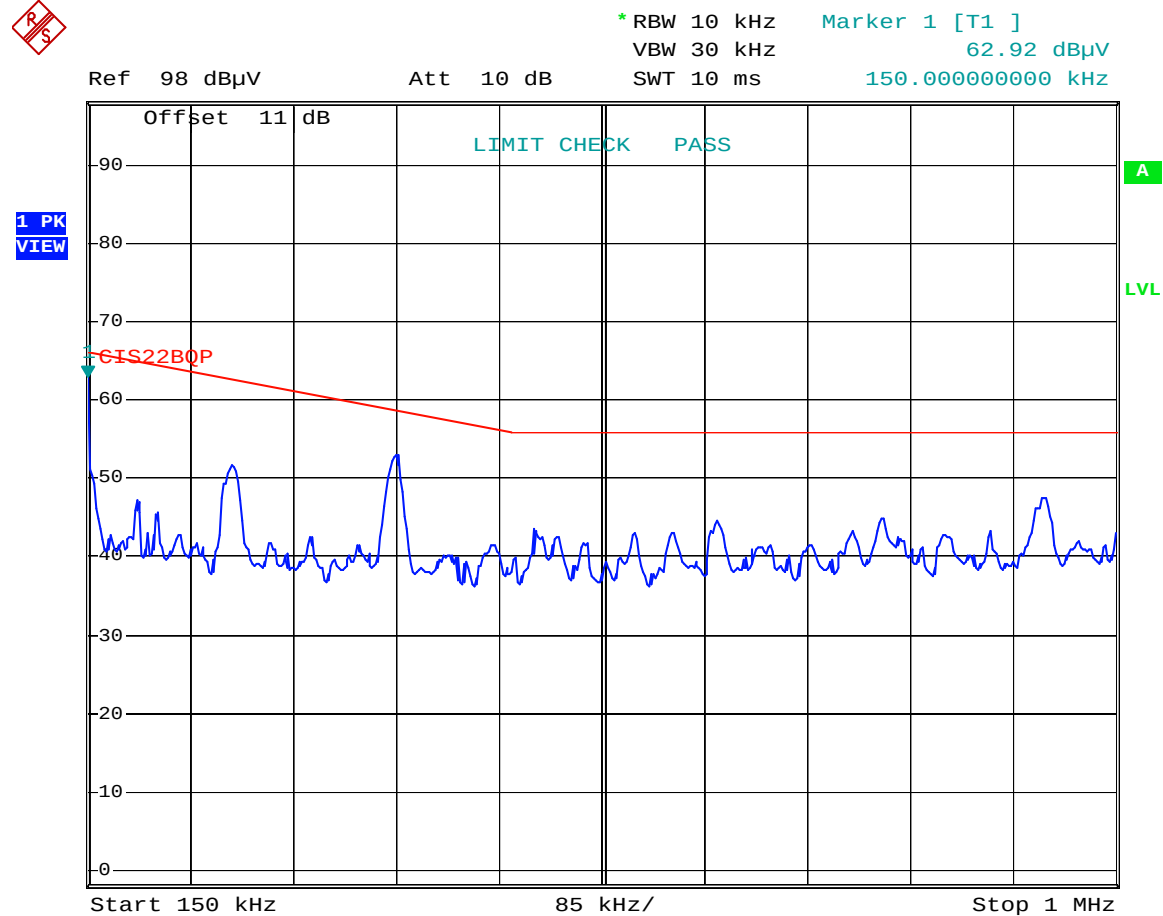
Date: 20.JUN.2006 10:58:31

EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

L1

PEAK



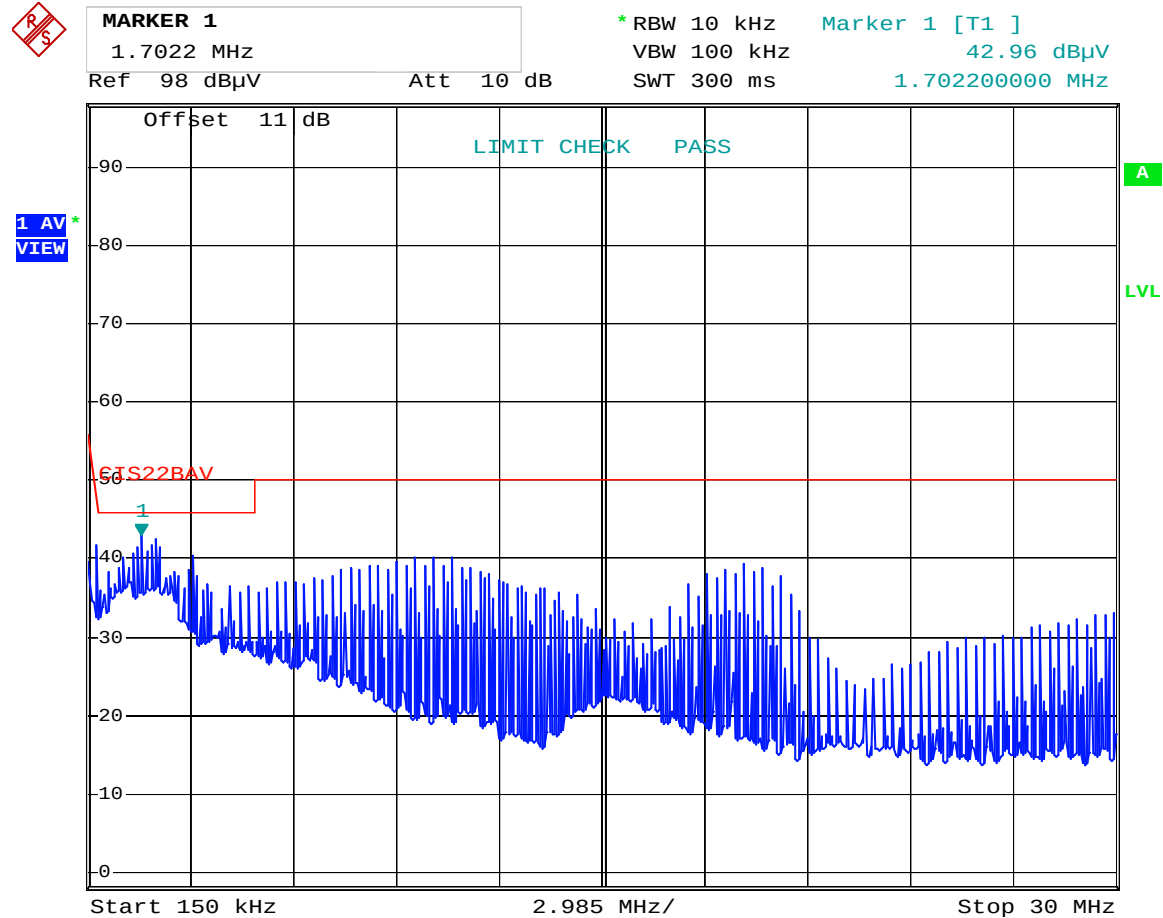
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EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

L1

AVERAGE



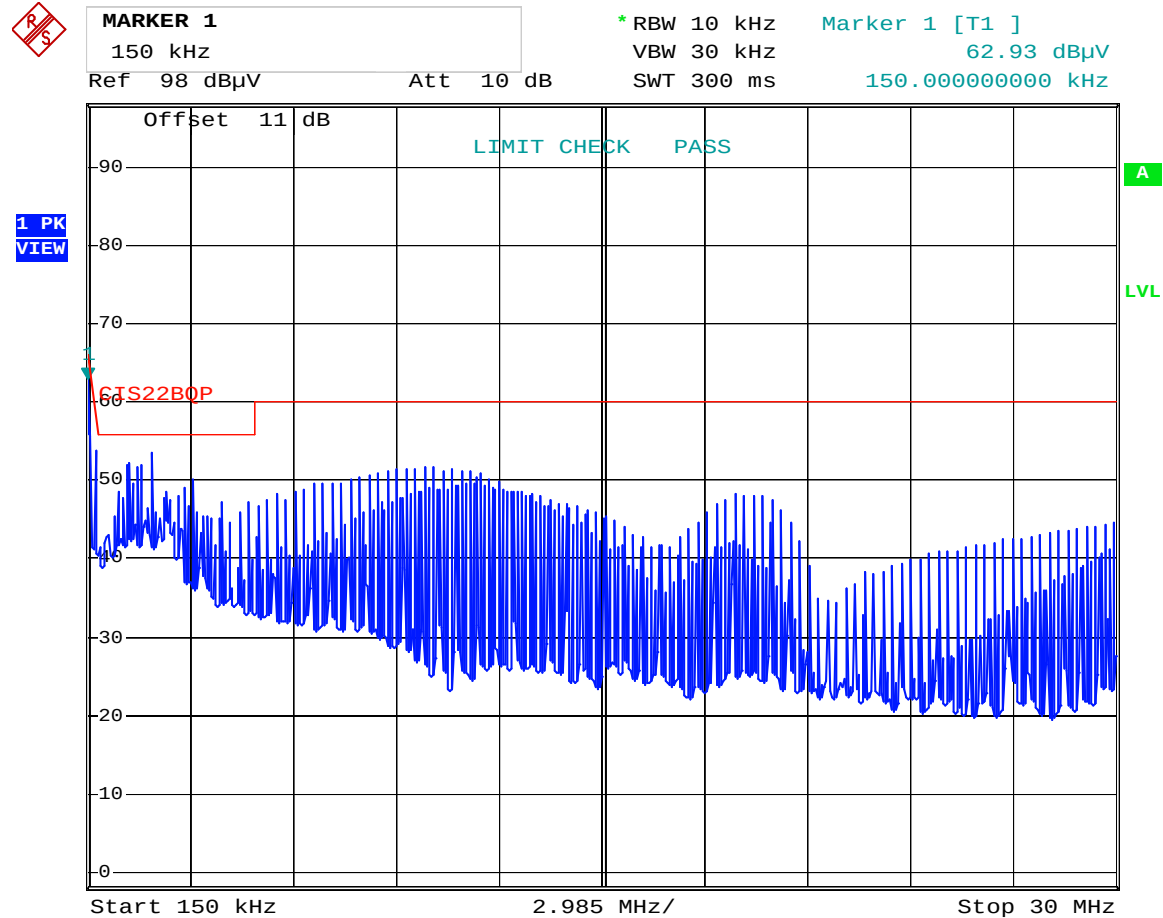
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EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

L2

PEAK



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

EQUIPMENT: RS320

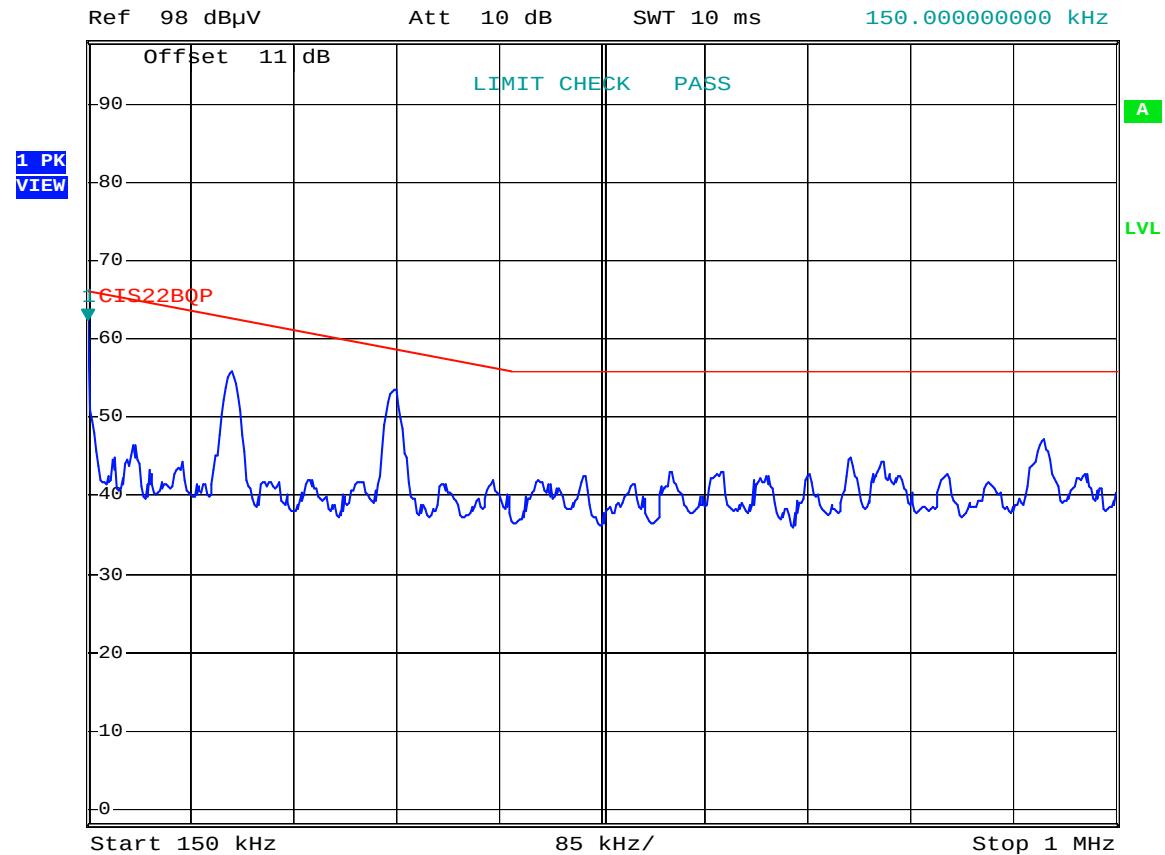
Test Data – Powerline Conducted Emissions

L2

PEAK



*RBW 10 kHz Marker 1 [T1]
VBW 30 kHz 62.34 dBμV
SWT 10 ms 150.000000000 kHz



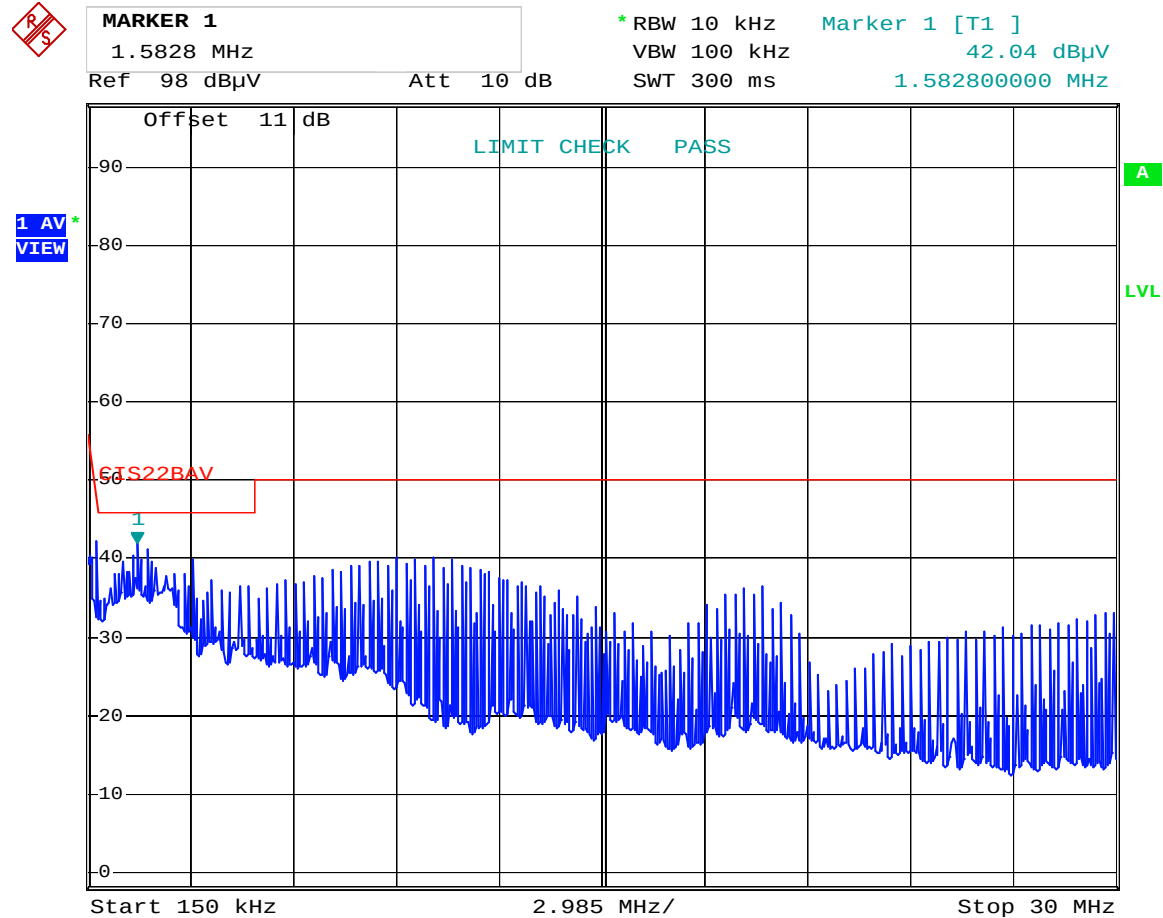
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EQUIPMENT: RS320

Test Data – Powerline Conducted Emissions

L2

AVERAGE



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 ($\mu\text{V/m}$)	Field Strength (dB μV)
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 dB $\mu\text{V/m}$ @ 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) - $(40 \log \frac{10}{300})$

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			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>											
Loop Ant. # :		Temp. (deg. C) :		Reference :							
<u>1140</u>		<u>22</u>		Date : <u>06/20/06</u>							
Bicon Ant.#:		Humidity (%) :		Time : <u>9:00</u>							
		<u>40</u>		Staff : <u>D. Light</u>							
Log Ant.#:				Photo ID: <u>NA</u>							
Bilog Ant.#:				Peak Bandwidth: <u>10 kHz</u>							
Dipole Ant.#:				Video Bandwidth <u>10 kHz</u>							
Cable#:		<u>2075</u>									
Preamp#:		Distance: <u>3 m</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'.

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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

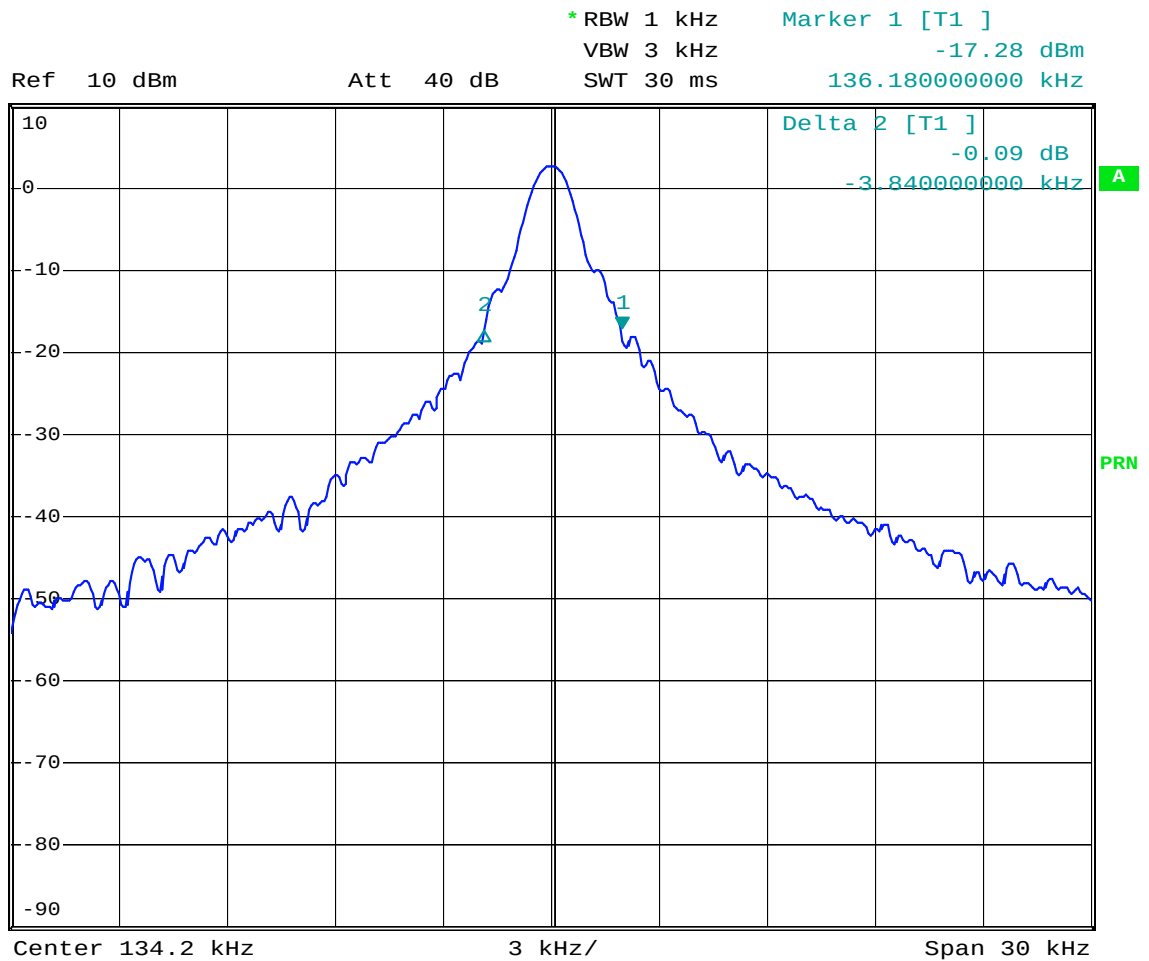
Minimum Standard: Not specified.**Test Results:** The 99% power occupied bandwidth is 3.84 kHz.**Measurement Data:** See attached graph(s).**Method of Measurement:**

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.

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1 PK
MAXH



Date: 20.JUN.2006 15:00:54

EQUIPMENT: RS320

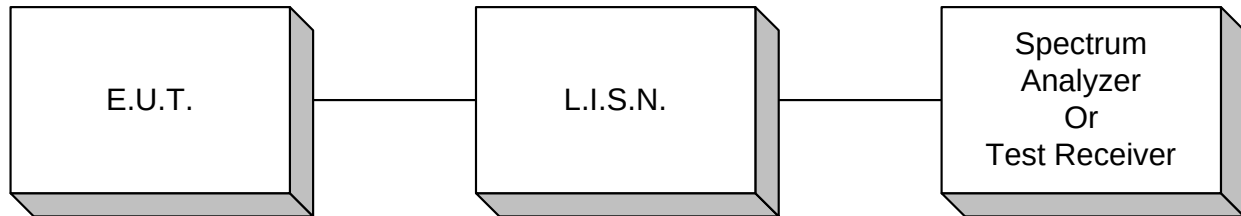
Section 6. Test Equipment List

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

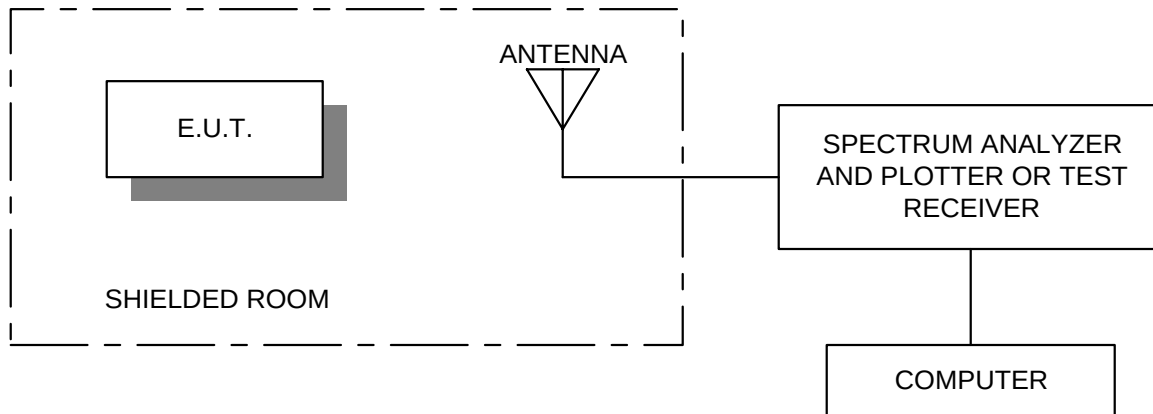
ANNEX A
TEST DIAGRAMS

EQUIPMENT: RS320

Conducted Emissions



Radiated Prescan



Test Site For Radiated Emissions

