Nemko Test Report:	4L0587RUS1_Rev1
Applicant:	RF SAW, Inc. 900 Alpha Drive, Suite 400 Richardson, Texas 75081-6625
Equipment Under Test: (E.U.T.)	Model 501 Reader
FCC ID:	SHT005010
In Accordance With: Transmitters	FCC Part 15, Subpart C, 15.249
Tested By:	Nemko USA Inc. 802 N. Kealy Lewisville, Texas 75057-3136
Authorized By:	 David Light, Production Group Manager
Date:	13 October, 2004
Total Number of Pages:	26

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Section 1. Summary Of Test Results

Manufacturer: RF SAW

Model No.: 501

Serial No.: 001

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 15.249. All tests were conducted using measurement procedure ANSI C63.4-2001. 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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Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Conducted Emissions	15.207	Complies
Radiated Emissions	15.249	Complies

Footnotes:
None

Section 2. General Equipment Specification

Frequency Range:	Single	
Operating Frequency(ies) of Sample:	2401.75 – 2480.16 MHz	
Tunable Bands:	1	
Emission Designator:	78M4N0N	
User Frequency Adjustment:	None	
Integral Antenna	Yes ☐	No ☒

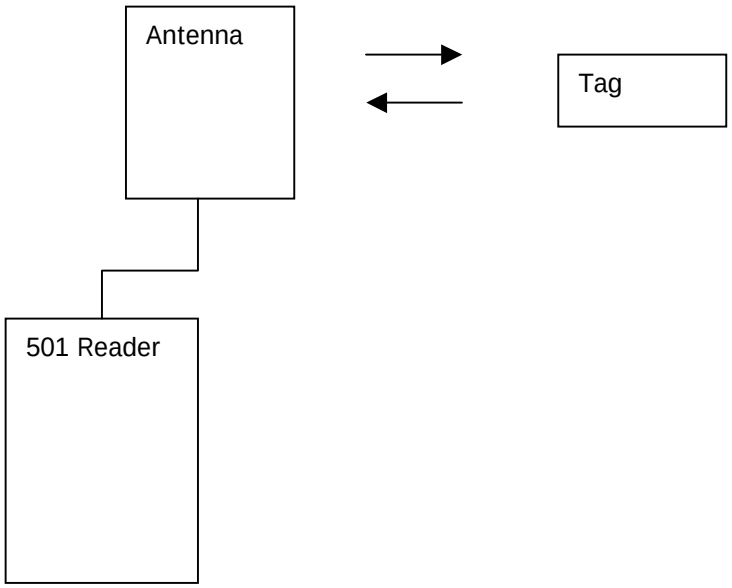
The antenna output connector is reverse gender SMA type. A variety of antennas are provided with the device depending on the installation environment. Compliance is not dependant on any particular antenna cable length. Antennas are provided with an adapter from a standard type connector to reverse gender SMA type. The adapter is permanently connected to the antenna with Loctite and heat shrink tubing. Thus a reverse gender SMA connection is permanently added to the antenna, making the connection on both the transmitter end and the antenna end non-standard type connections.

Description of Device Tested

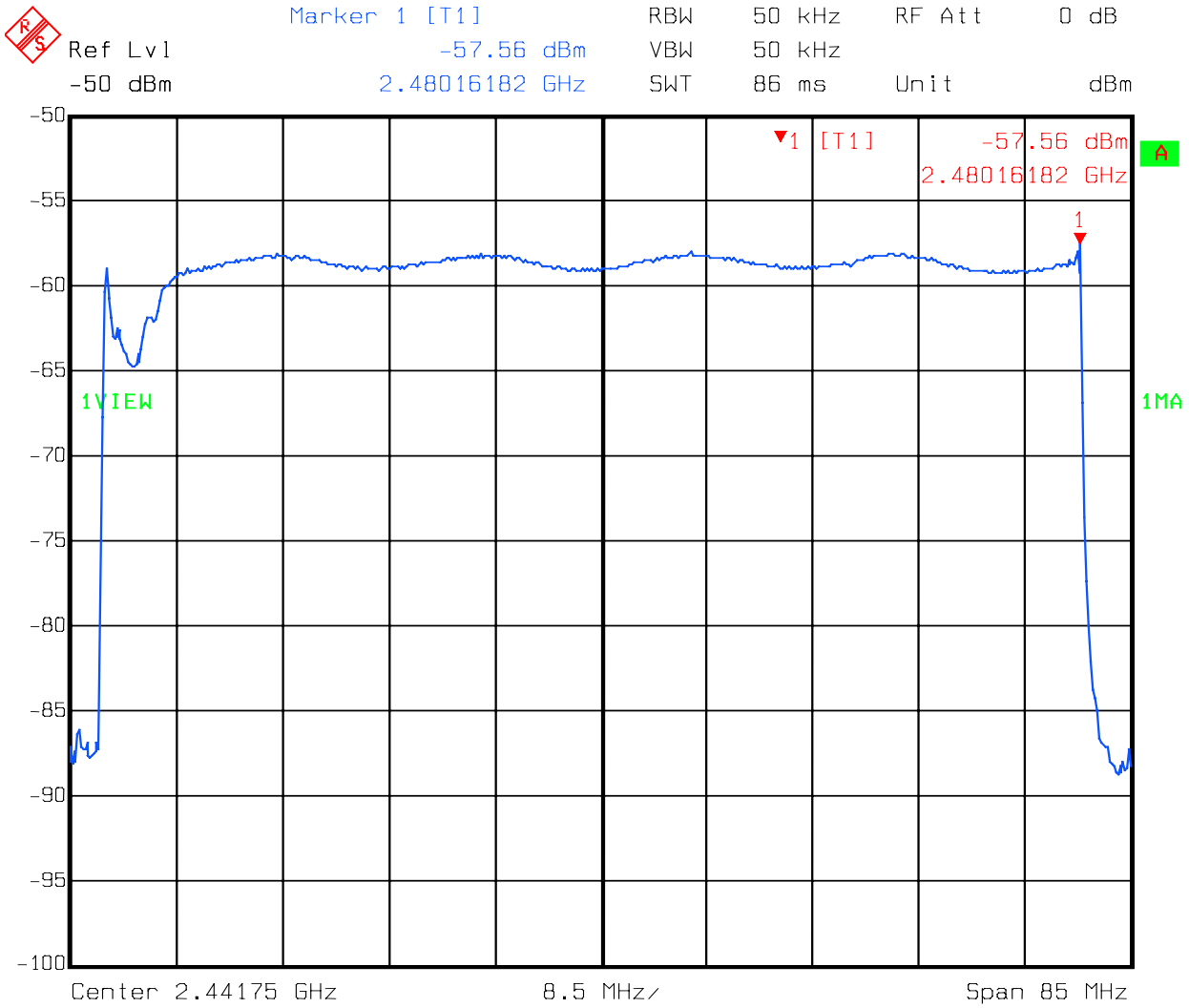
The model 501 Reader is part of an RF ID system. The Reader transmits a swept signal across the 2.4 – 2.483 GHz band. Passive tags built on RF SAW (Surface Acoustic Wave) technology scatter the rf signal back in a pattern that is unique to the individual tag. The reader is thus able to identify the tag.

System Diagram

Power Supply: RF SAW P/N. 413-0001-001
120 Vac input, 24 Vdc output



EQUIPMENT: 501 Reader



99% Occupied Bandwidth = 78.41 MHz

Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY: Brian Boyea	DATE: 8 Sept. 2004

Minimum Standard: Class B limits

Test Results: Complies. See attached graph(s).

Measurement Data: See attached graph(s).

Method of Measurement: (Procedure ANSI C63.4-1992)

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.

Asset Number	Description	Manufacturer	Model Number	Serial Number	Last Cal	Cal Due
1258	LISN .15 MHz-30 MHz	EMCO	0	1305	09/15/03	09/14/04
1555	Filter high pass 5 kHz	Solar Electronics	7930-5.0	933125	09/10/03	09/09/04
1506	1m Cable	KTL	0	0	06/09/04	06/09/05
1267	CABLE, 14.8m	KTL	RG223	N/A	07/27/04	07/27/05
785	ANALYZER, SPECTRUM	HP	8591E	3412A02996	06/08/04	06/08/05
966	Receiver	Rohde & Schwartz	ESH2	880370/029	09/17/03	09/16/04

Conducted Emissions

Powerline Voltage Measurement

Complete	X	Job # :	4L0587E	Test # :	CEPV-01
Preliminary		Page	1	of	1

Client Name :	RF SAW				
EUT Name :	501 Reader				
EUT Model # :	501				
EUT Part # :	None				
EUT Serial # :	1				
EUT Config. :	Full Transmit mode				
Specification :	Part 15 Subpart B Class B			Reference :	
Transducer # :	1258	Temp. (deg. C) :	23	Date :	09/08/04
HP Filter # :	1555	Humidity (%) :	33	Time :	9:30 A.M.
Cable 1 # :	1506	EUT Voltage :	120 vac	Staff :	Brian Boyea
Cable 2 # :	1267	EUT Frequency :	60 Hz	Location :	SR
Detector 1 # :	785	Peak Bandwidth:	10kHz	Photo ID:	4L0587E CEPV-01
Detector 2 # :	966	QP Bandwidth	10kHz		
Limiter # :		Avg. Bandwidth	10kHz		

Meas. Freq. (MHz)	EUT Test Point	Detector Type (P,QP, A)	Limit Type (QP, A)	Meter Reading (dBuV)	Path Loss (dB)	Transducer Factor (dB)	Corrected Reading (dBuV)	Spec.limit (dBuV) Q.P.	Spec.limit (dBuV) Avg.	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
0.16	N	QP	QP	49.0	0	0	49.0	65.46	55.464	-16.5	Pass	
0.16	N	A	A	17.5	0	0	17.5	65.46	55.464	-38.0	Pass	
0.22	N	QP	QP	49.0	0	0	49.0	62.82	52.819	-13.8	Pass	
0.22	N	A	A	17.0	0	0	17.0	62.82	52.819	-35.8	Pass	
0.3	N	QP	QP	48.0	0	0	48.0	60.24	50.243	-12.2	Pass	
0.3	N	A	A	17.0	0	0	17.0	60.24	50.243	-33.2	Pass	
0.16	H	QP	QP	48.5	0	0	48.5	65.46	55.464	-17.0	Pass	
0.16	H	A	A	17.5	0	0	17.5	65.46	55.464	-38.0	Pass	
0.22	H	QP	QP	48.0	0	0	48.0	62.82	52.819	-14.8	Pass	
0.22	H	A	A	17.0	0	0	17.0	62.82	52.819	-35.8	Pass	
0.3	H	QP	QP	45.5	0	0	45.5	60.24	50.243	-14.7	Pass	
0.3	H	A	A	16.5	0	0	16.5	60.24	50.243	-33.7	Pass	
											Scanned	
											.15-30	

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Conducted Photographs (Worst Case Configuration)

Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.249
TESTED BY: Tom Tidwell	DATE: 8 September, 2004

Minimum Standard: Para no. 15.249

The field strengths shall not exceed the following:

Fundamental (MHz)	Field Strength (mV/m)	Field Strength (dBµV)	Harmonic (mV/m)	Harmonic (dBµV)
902-928	50	94	0.5	54
2400-2483.5	50	94	0.5	54

Field strength limits are specified at a distance of 3 metres.

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated limits of 15.209 whichever is the less attenuation.

...for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Test Results: Complies

Measurement Data: See attached table.

Maximizing Emission Levels: The field strength of emissions is maximized by adjusting the azimuth of the turntable and the height of the antenna mast. Each transmit antenna is mounted per the installation instructions.

The supply voltage to the EUT was varied from 85% - 115% (102 – 138 Vac) of the nominal supply voltage (120 Vac) with no effect noted on rf output level.

Low, Mid, and High Channel frequencies were measured. The worst-case results are reported.

Antenna Assemblies	RF SAW P/N.
9 dB gain LCP polarized-HS	414-0001-001
12 dB gain linear polarized-HS	414-0002-001
15 dB gain LCP polarized-HS	414-0003-001
15 dB gain linear polarized-HS	414-0004-001
17 dB gain LCP polarized - HS	414-0005-001
17 dB gain linear polarized-HS	414-0006-001
18 dB gain LCP polarized-HS	414-0007-001
18 dB gain linear polarized-HS	414-0008-001
8 dB gain LCP polarized-HLT	414-0009-001
8 dB gain linear polarized-HLT	414-0010-001
14 dB gain linear polarized-HLT	414-0011-001
15 dB gain linear polarized-HLT	414-0012-001
18 dB gain linear polarized-HLT	414-0013-001
18 dB gain linear polarized-MR	414-0014-001
24 dB gain linear polarized-A (parabolic)	414-0015-001

*Antennas tested. The highest gain of each type of antenna was tested.

Test Data - Radiated Emissions

Radiated Emissions

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Job No.: 4L0587 Date: 7 Sept. 2004

Specification: 15.249 Temperature(°C): 25

Tested By: Tom Tidwell Relative Humidity(%) 42

E.U.T.: Model 501 Reader

Configuration: 414-0001-001, Huber+Suhner Panel Antenna, 1324.19.006, 9 dBi gain

Sample Number:

Location: AC 3 RBW: 1 MHz

Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna:	1304	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1484
Filter:	1482	Cable #2:	1485
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

Additional equipment used:

Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
2.415	70.7	8.3	3.1	0	82.1	94	-11.9	Vertical
2.415	45.5	8.3	3.1	0	56.9	94	-37.1	Horizontal
2.4835	33.2	8.3	3.1	0	44.6	54	-9.4	Vertical
2.4835	22.2	8.3	3.1	0.0	33.6	54	-20.4	Horizontal
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Vertical - Ambient
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Horizontal - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Vertical - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Horizontal - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Vertical - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Horizontal - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Vertical - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Horizontal - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Vertical - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Horizontal - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Vertical - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Horizontal - Ambient
19.602	35.2	40.3	10.2	46.6	39.1	54	-14.9	Vertical - Ambient
19.6020	35.2	40.3	10.2	46.6	39.1	54	-14.9	Horizontal - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Vertical - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Horizontal - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Vertical - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Horizontal - Ambient

Notes:

Radiated Emissions

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Job No.: 4L0587 Date: 7 Sept. 2004

Specification: 15.249 Temperature(°C): 25

Tested By: David Light Relative Humidity(%) 42

E.U.T.:

Configuration: Huber+Suhner Panel Antenna, 1324.19.0011, 18 dBi gain

Sample Number:

Location: AC 3 RBW: 1 MHz

Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna:	1304	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1484
Filter:	1482	Cable #2:	1485
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

Additional equipment used:

Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
2.415	68.6	8.3	3.1	0	80	94	-14	Vertical
2.415	51.6	8.3	3.1	0	63	94	-31	Horizontal
2.4835	31.4	8.3	3.1	0	42.8	54	-11.2	Vertical
2.4835	25.7	8.3	3.1	0.0	37.1	54	-16.9	Horizontal
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Vertical - Ambient
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Horizontal - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Vertical - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Horizontal - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Vertical - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Horizontal - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Vertical - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Horizontal - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Vertical - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Horizontal - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Vertical - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Horizontal - Ambient
19.602	35.2	40.3	10.2	46.6	39.1	54	-14.9	Vertical - Ambient
19.6020	35.2	40.3	10.2	46.6	39.1	54	-14.9	Horizontal - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Vertical - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Horizontal - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Vertical - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Horizontal - Ambient
Notes:								

Radiated Emissions

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Job No.:	4L0587	Date: 7 Sept. 2004	
Specification:	15.249	Temperature(°C):	25
Tested By:	Tom Tidwell	Relative Humidity(%)	42
E.U.T.:	Model 501 Reader		
Configuration:	RF SAW P/N. 414-0009-001, Hyperlink Antenna, HG2409PCL-XX, 8 dBi gain		
Sample Number:			
Location:	AC 3	RBW:	1 MHz
Detector Type:	Peak	VBW:	1 MHz

Test Equipment Used

Antenna:	1304	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1484
Filter:	1482	Cable #2:	1485
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

Additional equipment used:

Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
2.415	66	8.3	3.1	0	77.4	94	-16.6	Vertical
2.415	66	8.3	3.1	0	77.4	94	-16.6	Horizontal
2.4835	28.2	8.3	3.1	0	39.6	54	-14.4	Vertical
2.4835	28	8.3	3.1	0.0	39.4	54	-14.6	Horizontal
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Vertical - Ambient
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Horizontal - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Vertical - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Horizontal - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Vertical - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Horizontal - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Vertical - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Horizontal - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Vertical - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Horizontal - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Vertical - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Horizontal - Ambient
19.602	35.2	40.3	10.2	46.6	39.1	54	-14.9	Vertical - Ambient
19.6020	35.2	40.3	10.2	46.6	39.1	54	-14.9	Horizontal - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Vertical - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Horizontal - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Vertical - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Horizontal - Ambient

Notes:

EQUIPMENT: 501 Reader

Radiated Emissions

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Job No.: 4L0587 Date: 7 Sept. 2004

Specification: 15.249 Temperature(°C): 25

Tested By: Tom Tidwell Relative Humidity(%) 42

E.U.T.: Model 501 Reader

Configuration: RF SAW P/N. 414-0010-001, Hyperlink Antenna, HG2409P, 8 dBi gain

Sample Number:

Location: AC 3 RBW: 1 MHz

Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna:	1304	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1484
Filter:	1482	Cable #2:	1485
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

Additional equipment used:

Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
2.415	66.8	8.3	3.1	0	78.2	94	-15.8	Vertical
2.415	66.8	8.3	3.1	0	78.2	94	-15.8	Horizontal
2.4835	29	8.3	3.1	0	40.4	54	-13.6	Vertical
2.4835	29	8.3	3.1	0.0	40.4	54	-13.6	Horizontal
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Vertical - Ambient
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Horizontal - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Vertical - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Horizontal - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Vertical - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Horizontal - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Vertical - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Horizontal - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Vertical - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Horizontal - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Vertical - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Horizontal - Ambient
19.602	35.2	40.3	10.2	46.6	39.1	54	-14.9	Vertical - Ambient
19.6020	35.2	40.3	10.2	46.6	39.1	54	-14.9	Horizontal - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Vertical - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Horizontal - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Vertical - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Horizontal - Ambient

Notes:

Radiated Emissions

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Job No.:	4L0587	Date:	7 Sept. 2004
Specification:	15.249	Temperature(°C):	25
Tested By:	Tom Tidwell	Relative Humidity(%)	42
E.U.T.:	Model 501 Reader		
Configuration:	RF SAW P/N. 414-0012-001, Hyperlink Panel Antenna, HG2416P, 15 dBi gain		
Sample Number:			
Location:	AC 3	RBW:	1 MHz
Detector Type:	Peak	VBW:	1 MHz

Test Equipment Used

Antenna:	1304	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1484
Filter:	1482	Cable #2:	1485
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

Additional equipment used:

Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
2.415	68.1	8.3	3.1	0	79.5	94	-14.5	Vertical
2.415	54.1	8.3	3.1	0	65.5	94	-28.5	Horizontal
2.4835	44.8	8.3	3.1	32.8	23.4	54	-30.6	Vertical
2.4835	31.2	8.3	3.1	32.8	9.8	54	-44.2	Horizontal
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Vertical - Ambient
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Horizontal - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Vertical - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Horizontal - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Vertical - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Horizontal - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Vertical - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Horizontal - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Vertical - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Horizontal - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Vertical - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Horizontal - Ambient
19.602	35.2	40.3	10.2	46.6	39.1	54	-14.9	Vertical - Ambient
19.6020	35.2	40.3	10.2	46.6	39.1	54	-14.9	Horizontal - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Vertical - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Horizontal - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Vertical - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Horizontal - Ambient

Notes:

Radiated Emissions

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Job No.: 4L0587 Date: 7 Sept. 2004

Specification: 15.249 Temperature(°C): 25

Tested By: Tom Tidwell Relative Humidity(%) 42

E.U.T.: Model 501 Reader

Configuration: RF SAW P/N. 414-0014-001, MAXRAD Panel Antenna, WISP24018, 18 dBi gain

Sample Number: 1

Location: AC 3 RBW: 1 MHz

Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna:	1304	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1484
Filter:	1482	Cable #2:	1485
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

Additional equipment used:

Measurement Uncertainty: +/- .7 dB

Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
2.415	71.3	8.3	3.1	0	82.7	94	-11.3	Vertical
2.415	50.6	8.3	3.1	0	62	94	-32	Horizontal
2.4835	41.4	8.3	3.1	32.8	20	54	-34	Vertical
2.4835	26.3	8.3	3.1	32.8	4.9	54	-49.1	Horizontal
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Vertical - Ambient
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Horizontal - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Vertical - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Horizontal - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Vertical - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Horizontal - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Vertical - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Horizontal - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Vertical - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Horizontal - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Vertical - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Horizontal - Ambient
19.602	35.2	40.3	10.2	46.6	39.1	54	-14.9	Vertical - Ambient
19.6020	35.2	40.3	10.2	46.6	39.1	54	-14.9	Horizontal - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Vertical - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Horizontal - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Vertical - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Horizontal - Ambient

Notes:

Radiated Emissions

Page 1 of 1

Job No.: 4L0587 Date: 7 Sept. 2004

Specification: 15.249 Temperature(°C): 25

Tested By: David Light Relative Humidity(%) 42

E.U.T.:

Configuration: Andrew T-2400 Parabolic Antenna, 24 dBi gain

Sample Number:

Location: AC 3 RBW: 1 MHz

Detector Type: Peak VBW: 1 MHz

Test Equipment Used

Antenna:	1304	Directional Coupler:	#N/A
Pre-Amp:	1016	Cable #1:	1484
Filter:	1482	Cable #2:	1485
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

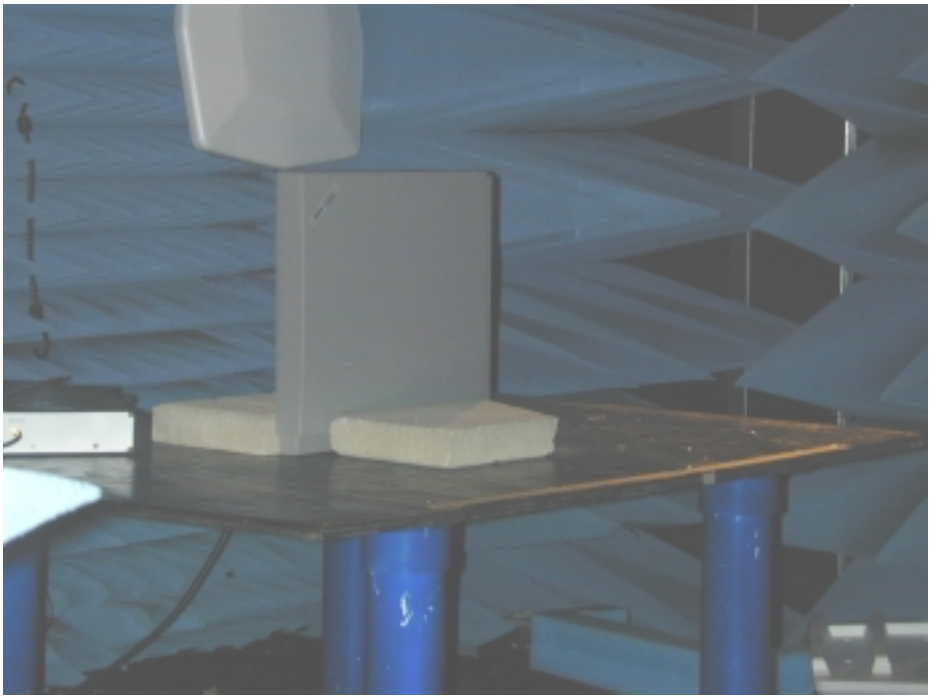
Additional equipment used:

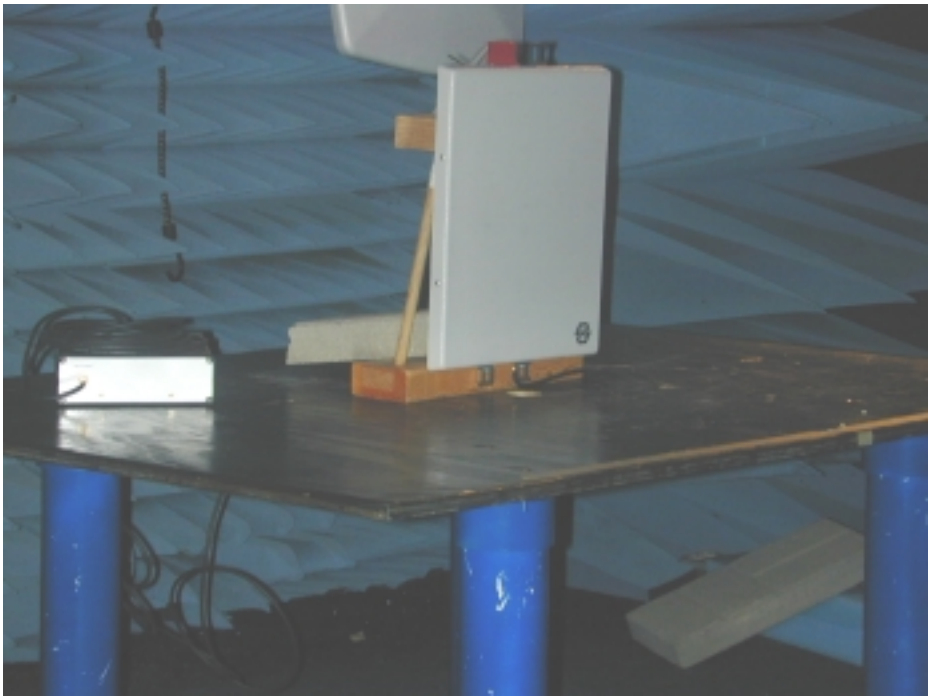
Measurement Uncertainty: +/- .7 dB

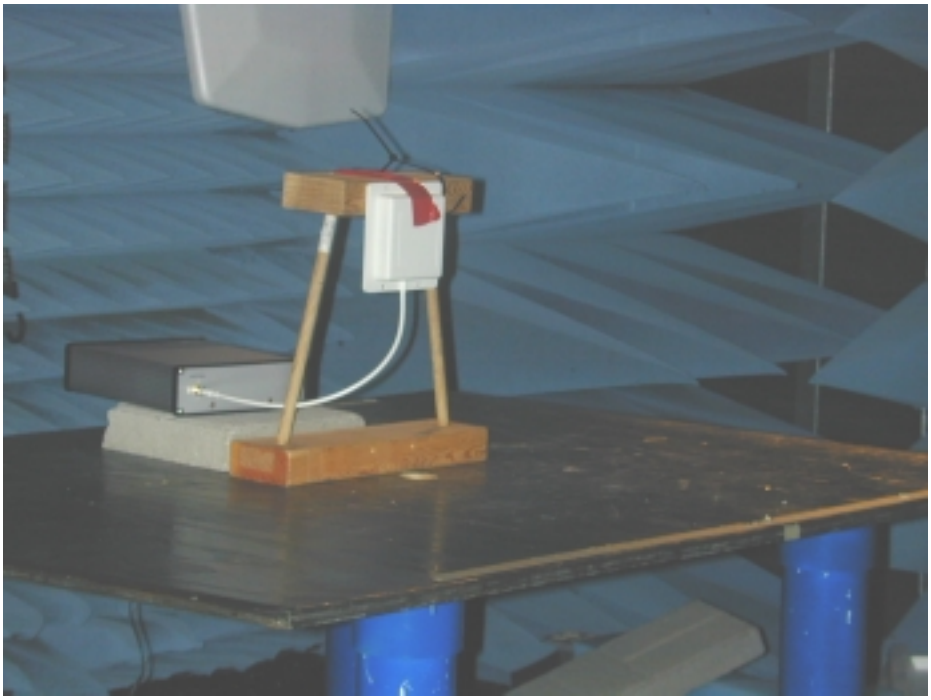
Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
2.4111	82.3	8.3	3.1	0	93.7	94	-0.3	Vertical
2.4111	65.3	8.3	3.1	0	76.7	94	-17.3	Horizontal
2.4835	50.8	8.3	3.1	32.5	29.7	54	-24.3	Vertical
2.4835	50.8	8.3	3.1	32.5	29.7	54	-24.3	Horizontal
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Vertical - Ambient
4.900	42.1	10.2	4.6	32.7	24.2	54	-29.8	Horizontal - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Vertical - Ambient
7.351	40.1	11.5	6.3	32.9	25.0	54	-29.0	Horizontal - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Vertical - Ambient
9.801	42	13.8	6.9	34.5	28.2	54	-25.8	Horizontal - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Vertical - Ambient
12.2510	41.4	8.1	8.2	35.1	22.6	54	-31.4	Horizontal - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Vertical - Ambient
14.701	37.9	17.6	8.5	32.0	32.0	54	-22.0	Horizontal - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Vertical - Ambient
17.152	39.9	21.6	9.3	33.3	37.5	54	-16.5	Horizontal - Ambient
19.602	35.2	40.3	10.2	46.6	39.1	54	-14.9	Vertical - Ambient
19.6020	35.2	40.3	10.2	46.6	39.1	54	-14.9	Horizontal - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Vertical - Ambient
22.0524	35.1	40.4	11.6	49.8	37.3	54	-16.7	Horizontal - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Vertical - Ambient
24.5030	30.7	40.4	12.7	49.8	34.0	54	-20.0	Horizontal - Ambient

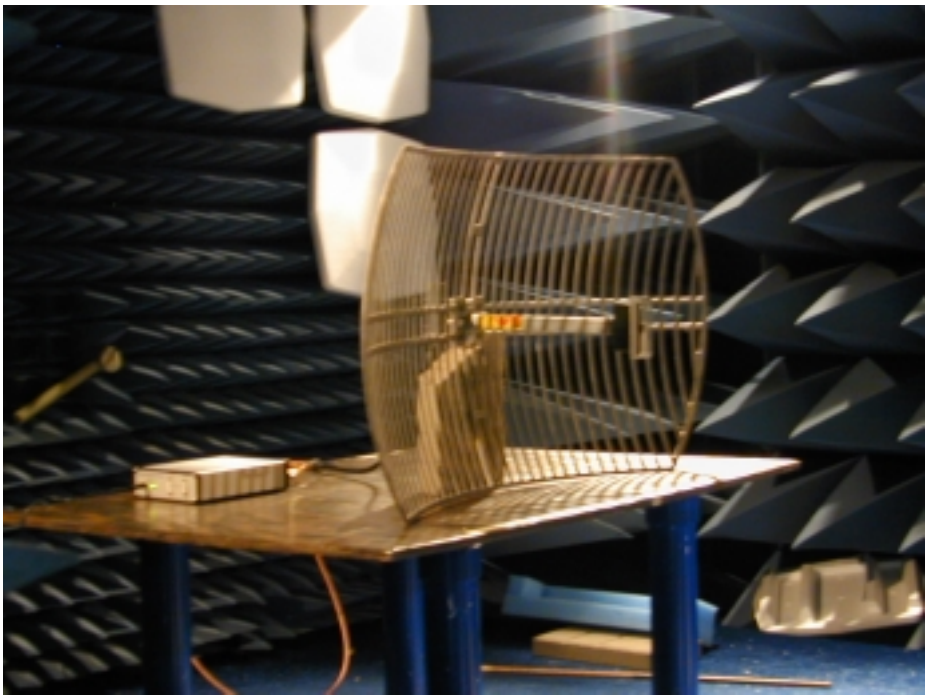
Notes:

Radiated Photographs (Worst Case Configuration)









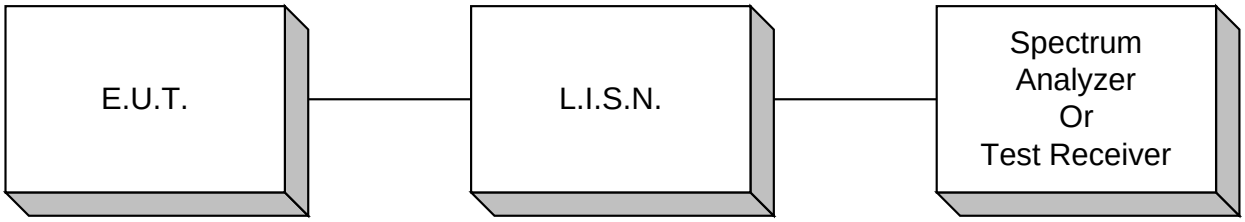
Section 5. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	10/27/03	10/26/04
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05
1482	Band Pass Filter	K & L 11SH10-4000/T12000-0/0	2	Cal B4 Use	N/A
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/24/04	07/23/05
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/24/04	07/23/05

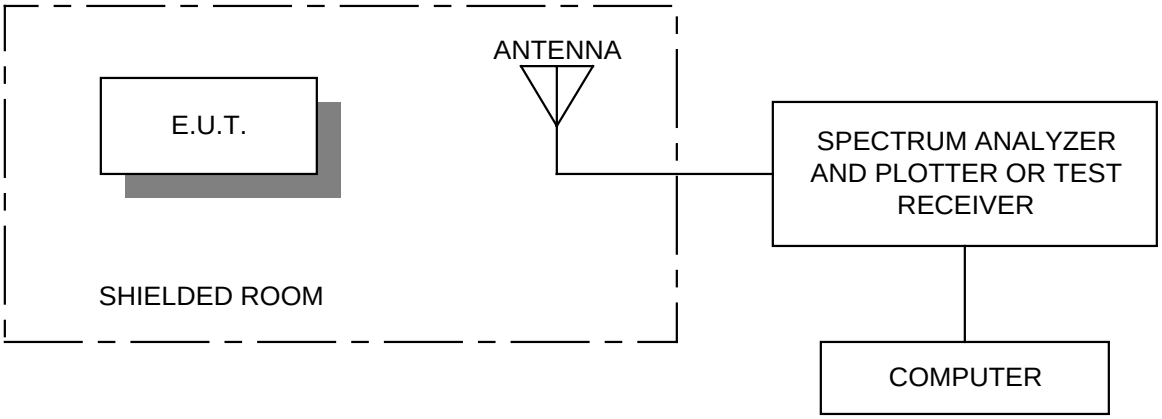
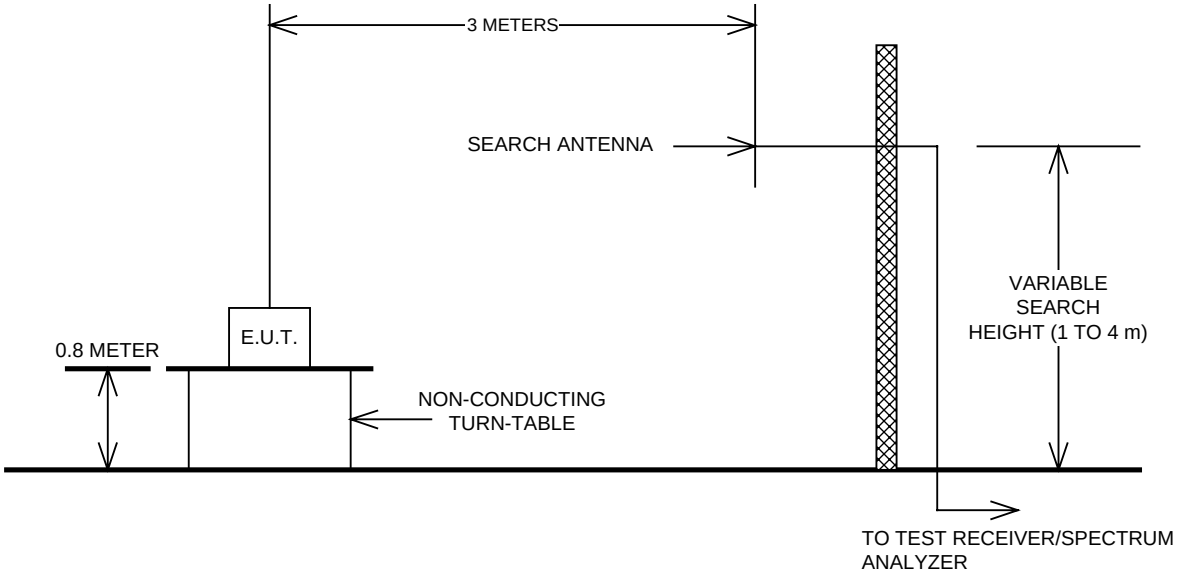
ANNEX A

TEST DIAGRAMS

Conducted Emissions



Radiated Prescan



Test Site For Radiated Emissions