Nemko Test Report: 6L0349RUS1 rev 6

Applicant: SAVR Communications, Inc.
3011 S. Skyway Circle
Irving, TX 75038
USA

Equipment Under Test: (E.U.T.) C2 - 13.56 MHz

In Accordance With: **FCC Part 15, Subpart C, Paragraph 15.225**
Operation within the band 13.110-14.010 MHz

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

TESTED BY: **DATE:** **August 28, 2006**

Kevin Rose, Wireless Engineer

APPROVED BY: **DATE:** **August 31, 2006**

David Light, Senior Wireless Engineer

Total number of pages: 20

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Section 1. Summary Of Test Results

Manufacturer: SAVR Communications, Inc.

Model No.: C2 - 13.56 MHz

Serial No.: 08060001T, 2T, 3T, 4T, 5T, 6T, 7T

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

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207	Complies
Radiated Emissions	15.209	Complies
Frequency Stability	15.225	Complies

Footnotes
During all the test the EUT was Transmitting full power

Section 2. General Equipment Specification

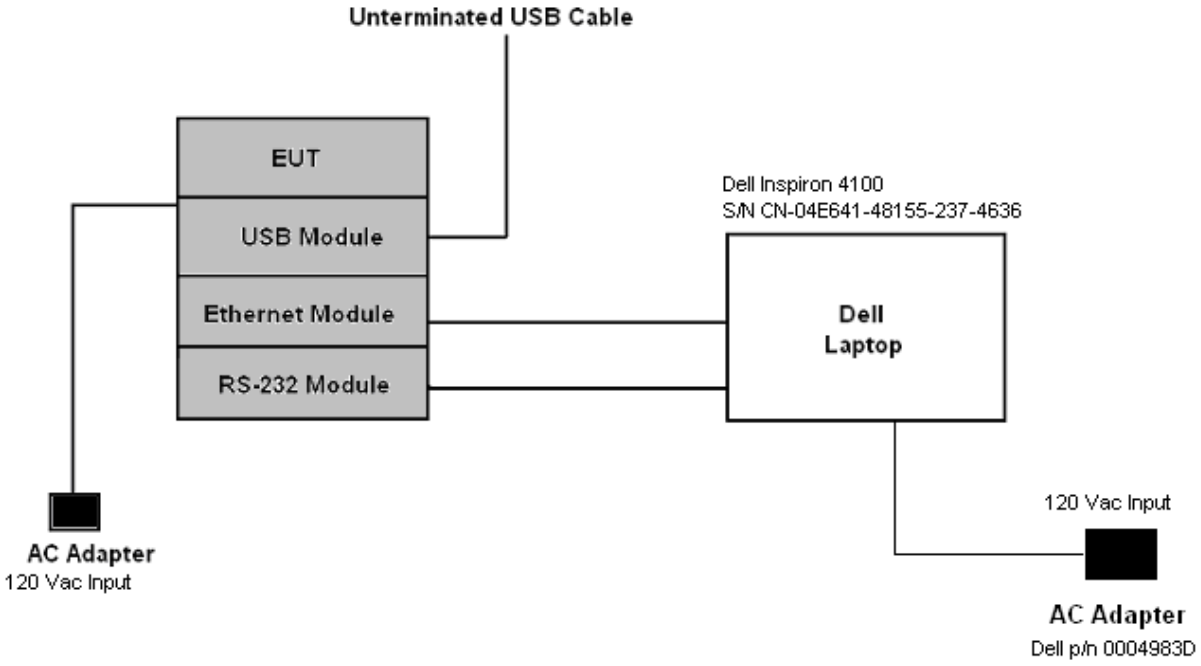
Frequency Range:	13.56 MHz Fixed
Operating Frequency(ies) of Sample:	13.56 MHz Fixed
Crystal Frequencies:	13.56 MHz

	Yes	**No**
Integral Antenna	☐	☒

Modifications Made During Testing

Added Wurth Elektrik p/n 2643540002 with three turns installed on power lead wire. This ferrite or equivalent to be added to BOM and assembly process to quieten radiated spurious emissions at 135.6 MHz.

System Diagram



Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY: Kevin Rose	DATE:August 11, 2006

Minimum Standard:

Limits for conducted disturbance at the mains ports

Frequency Range (MHz)	Quasi-peak Limits (dBuV)	Average Limits (dBuV)
0.15 to 0.50	66-56	56-46
0.50 to 5.00	56	46
5.00-30.0	60	50
The limit decreases with the logarithm of the frequency in the range 0.15MHz to 0.5 MHz		

Test Results: Complies.

Measurement Data: See attached graph(s).

The worse emission was 48.8 dBµV at 13.56MHz on the neutral side. This is 1.2dB below the specification limit of 50 dBµV.

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 9 kHz bandwidth, CISPR Quasi-Peak Detector.

Test Equipment Used: 1258-1547-1555-1534-1036-678

Test Data – Powerline Conducted Emissions

Conducted Emissions
Powerline Voltage Measurement

Complete X — Job # : 6L0349E — Test # : CEPV-01
Preliminary — Page 1 of 1

Client Name : SAVR Communications, Inc.
EUT Name : Connect & Communicate Modular RFID Reader
EUT Model # : C2 - 13.56 MHz
EUT Part # : C2101US00, C2201US00, C2302US00, C2301US00, C22501US00
EUT Serial # : 08060001T, 2T, 3T, 4T, 5T, 6T, 7T
EUT Config. : RFID reader functions in stand alone mode.

Specification :	Part 15.207	Barometric pressure:	1016	Reference :	ANSI 63.4
Transducer # :	1258	Temp. (deg. C) :	21	Date :	08/11/06
HP Filter # :	1555	Humidity (%) :	42	Time :	13:00
Cable 1 # :	1547	EUT Voltage :	6VDC	Staff :	Kevin Rose
Cable 2 # :	1534	EUT Frequency :	-	Location :	LAB 5
Detector 1 # :	1036	Peak Bandwidth:	10kHz	Photo ID:	CEPV-01
Detector 2 # :		QP Bandwidth	9kHz		
Limiter # :	674	Avg. Bandwidth	9kHz		

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
0.263	N	A	A	33.8	11	1	45.8	61.34	51.336	-5.5	Pass	
0.263	N	QP	QP	38.0	11	1	50.0	61.34	51.336	-11.4	Pass	
1.58	N	A	A	28.0	11	1	40.0	56	46	-6.0	Pass	
1.58	N	QP	QP	32.0	11	1	44.0	56	46	-12.0	Pass	
12.98	N	P	A	31.4	11	1	43.4	60	50	-6.6	Pass	
14.17	N	P	A	30.0	11	1	42.0	60	50	-8.0	Pass	
13.56	N	P	A	36.8	11	1	48.8	60	50	-1.2	Pass	
0.263	H	A	A	26.3	11	1	38.3	61.34	51.336	-13.0	Pass	
0.263	H	QP	QP	28.0	11	1	40.0	61.34	51.336	-21.3	Pass	
1.58	H	A	A	22.4	11	1	34.4	56	46	-11.6	Pass	
1.58	H	QP	QP	26.3	11	1	38.3	56	46	-17.7	Pass	
12.98	H	P	A	29.0	11	1	41.0	60	50	-9.0	Pass	
14.17	H	P	A	30.1	11	1	42.1	60	50	-7.9	Pass	
13.56	H	P	A	34.8	11	1	46.8	60	50	-3.2	Pass	

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Powerline Conducted Photographs

Section 4. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.225(a)
TESTED BY: Kevin Rose	DATE: August 23, 2006

Minimum Standard:

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209

Test Results: Complies.

Measurement Data: See attached. The carrier measured 66.5 dBµV/m at 3 meters. This is 57.5 below the specification limit of 124dBµV/m.

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 10^{th} 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 3m limit.

Example: Measurement Distance = 3m
Specification Distance = 30m

3m Limit: Specified limit (at 30m) - (40 Log $\frac{3}{30}$)

Thus for measurement at 3m the specified limit is increased by 40 dB.

Test Data - Radiated Emissions

Radiated Emissions

Page 1 of 2

Job No.:	6l0349R	Date:	8/23/2006
Specification:	15.225	Temperature(°C):	20
Tested By:	Kevin Rose	Relative Humidity(%)	40
E.U.T.:	RFID Reader		
Configuration:	Tx		
Sample Number:	1		
Location:	AC 3	RBW:	10 kHz
Detector Type:	Peak	VBW:	10 kHz

Test Equipment Used

Antenna:	1140	Directional Coupler:	#N/A
Pre-Amp:	#N/A	Cable #1:	1484
Filter:	#N/A	Cable #2:	1485
Receiver:	1036	Cable #3:	#N/A
Attenuator #1	#N/A	Cable #4:	#N/A
Attenuator #2:	#N/A	Mixer:	#N/A

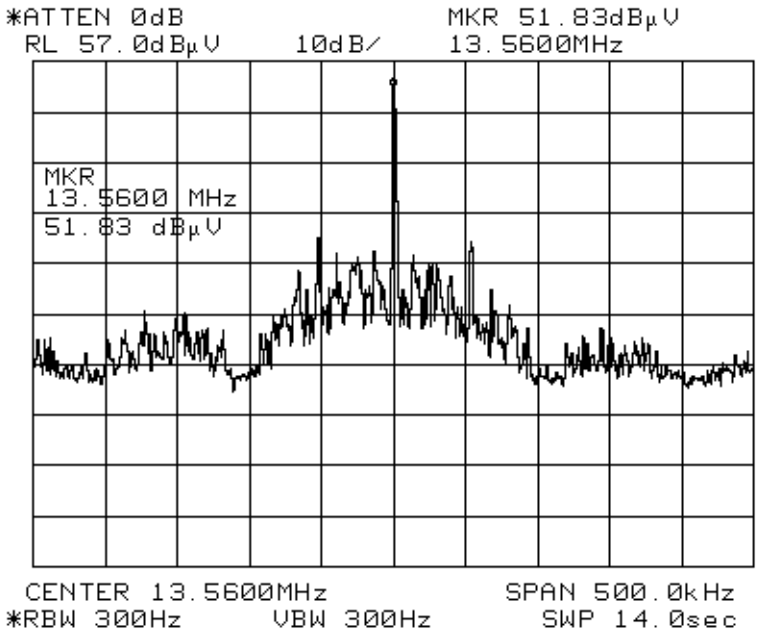
Measurement Uncertainty: +/- 3.6 dB

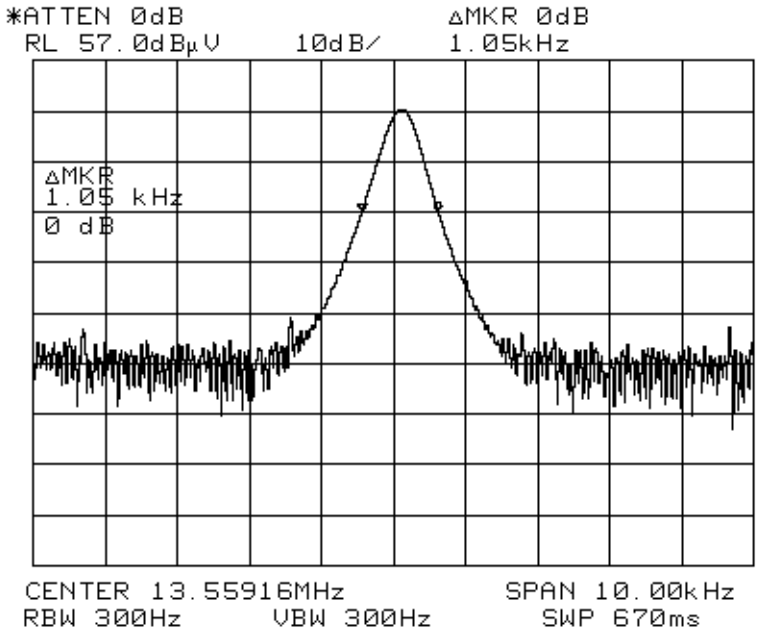
Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)		Detector / Polarity
13.560	60.8	4.7	1.0	0.0	66.5	124		external antenna
27.100	23.0	12.0	1.0	0.0	36.0	70		external antenna
								Searched 9 kHz-30 MHz

Supply voltage was varied from 102 Vac to 138 Vac with no effect on output power.

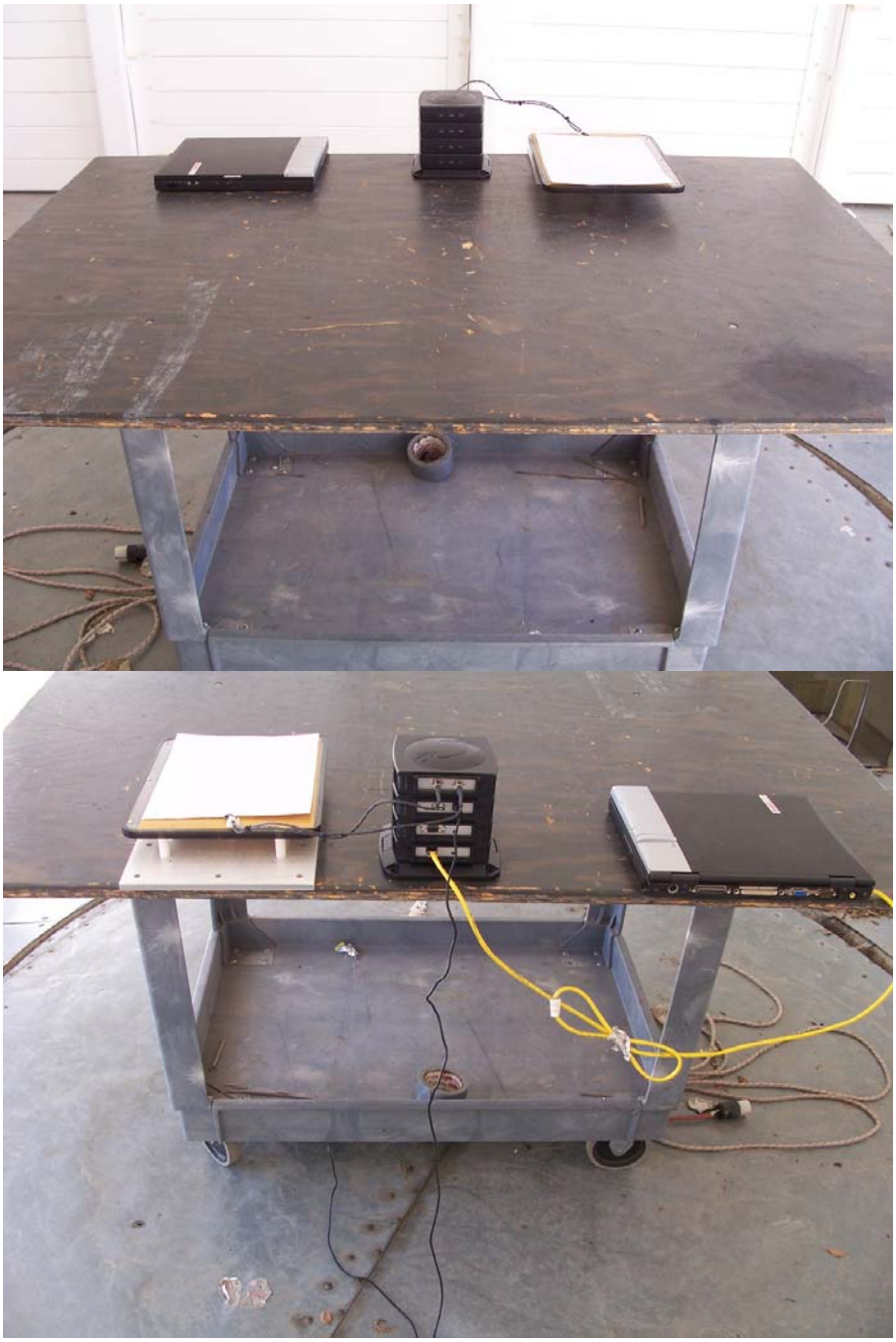
The EUT was orientated in all planes to maximize emissions.

Bandwidth Plots





Radiated Photographs



EUT pictures

Section 5. Frequency Error

NAME OF TEST: Frequency Error	PARA. NO.: 15.225(e)
TESTED BY: Kevin Rose	DATE: August 24, 2006

Minimum Standard: +/- 0.01% (1356 Hz)

Test Results: Complies. The maximum frequency error was 26.5 Hz (0.005%)

Test Equipment Used: 1036-283-1429

Method of Measurement:

Frequency Stability With Voltage Variation

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied
from -20 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured.

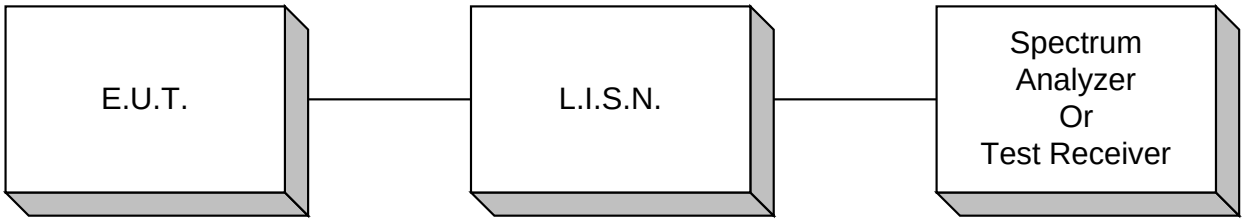
Section 6. Test Equipment List

Nemko ID	Description	Manufacturer / Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ / FSEK30	830844/006	05/26/06	05/26/08
1663	Spectrum Analyzer	Rhode & Schwarz / FSP	973351	05/18/06	05/18/07
1464	Spectrum analyzer	Hewlett Packard / 8563E	3551A04428	01/14/05	01/15/07
1484	Cable	Storm / PR90-010-072	N/A	08/26/05	08/26/06
1485	Cable	Storm / PR90-010-216	N/A	08/26/05	08/26/06
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS / SH27 & 2030-22844	129010083	06/19/06	06/19/07
1195	ANTENNA,BICONICAL	A.H. SYSTEMS / SAS-200/542	235	02/10/06	02/10/07
1508	ANTENNA, LP	Nemko USA, Inc. / 3146	1349	02/13/06	02/13/07
1514	CABLE ASSY, LAB 2- B OATS	Nemko USA, Inc. / SITE B OATS	N/A	06/08/06	06/08/07
1659	Spectrum Analyzer	Rhode & Schwarz / FSP	973353	01/10/06	01/10/07
1140	ACTIVE LOOP ANTENNA	A.H. SYSTEMS / SAS-200/562B	213	03/09/06	03/09/08
1258	LISN .15mhz-30mhz	EMCO / 0	1305	04/19/06	04/19/07
1555	Filter high pass 5KHz	Solar Electronics / 7930-5.0	933125	04/20/06	04/20/07
1081	CABLE 2m	Astrolab / 32027-2-29094-72TC	N/A	06/15/06	06/15/07
1429	Probe	Hewlett Packard / 11940A	2650A03328	01/00/00	N/A

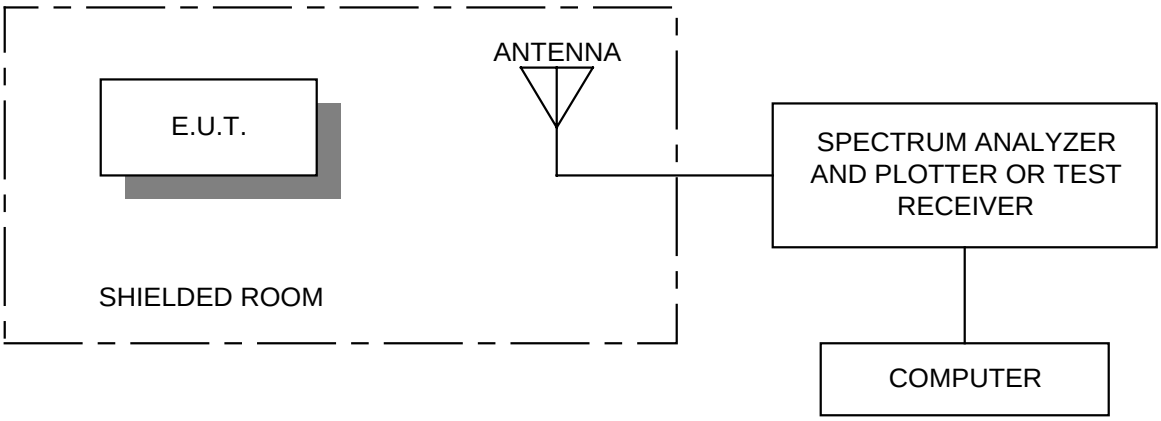
ANNEX A

TEST DIAGRAMS

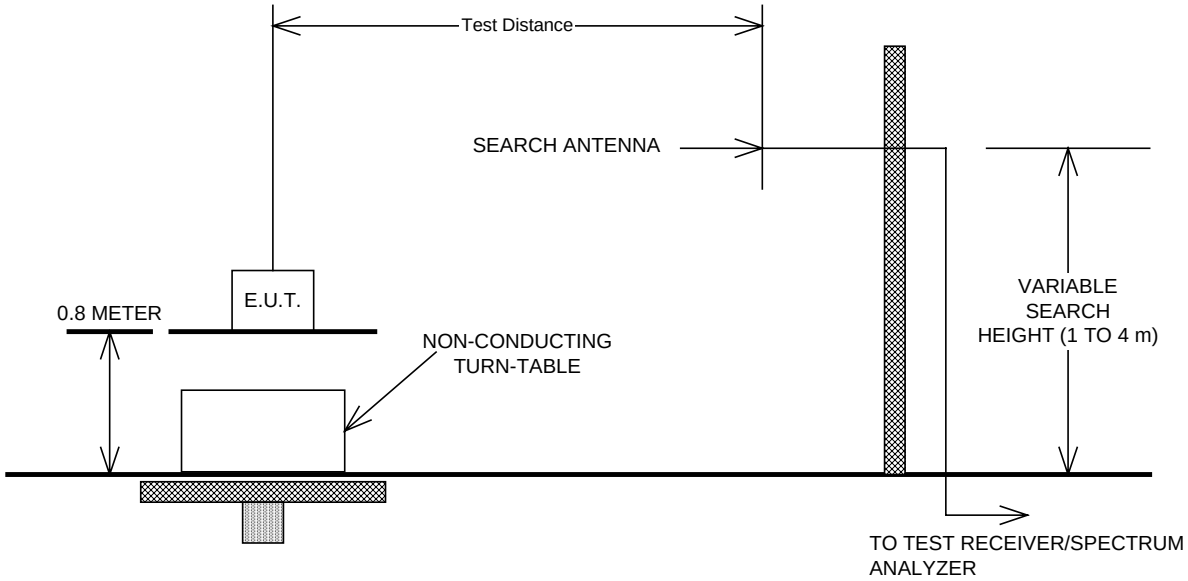
Conducted Emissions



Radiated Prescan



Test Site For Radiated Emissions



Frequency Error