Nemko Test Report:	23941RUS1Rev1
Applicant:	Element ID, Inc. 116 Research Drive, Suite 134 Bethlehem, PA 18015 USA
Equipment Under Test: (E.U.T.)	HF1 RFID Reader
FCC Identifier:	WNMHF100
In Accordance With:	**FCC Part 15, Subpart C 15.225** Operation within the band 13.110–14.010 MHz
Tested By:	Nemko USA, Inc. 802 N. Kealy Lewisville, TX 75057-3136

TESTED BY: _____ **DATE:** **30 March 2009**

David Light, Senior Wireless Engineer

APPROVED BY: _____ **DATE:** **31 March 2009**

Tom Tidwell, Telecom Direct

Total Number of Pages: 22

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Section 1. Summary of Test Results

Manufacturer: Element ID, Inc.

Model No.: HF1

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 Part 15, Subpart C, Paragraph 15.225. All tests were conducted using measurement procedure ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

☒ 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	Paragraph No.	Results
Field Strength	15.225(a)/(d)	Complies
Frequency Tolerance	15.225(e)	Complies
Powerline Conducted Emissions	15.207	Complies

Footnotes:

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Range:	13.110 to 14.010 MHz
Operating Frequency of Sample:	13.56 MHz
Type of Emission:	ASK, OOK
Supply Power Requirement:	120 Vac
Duty Cycle Correction Factor:	None

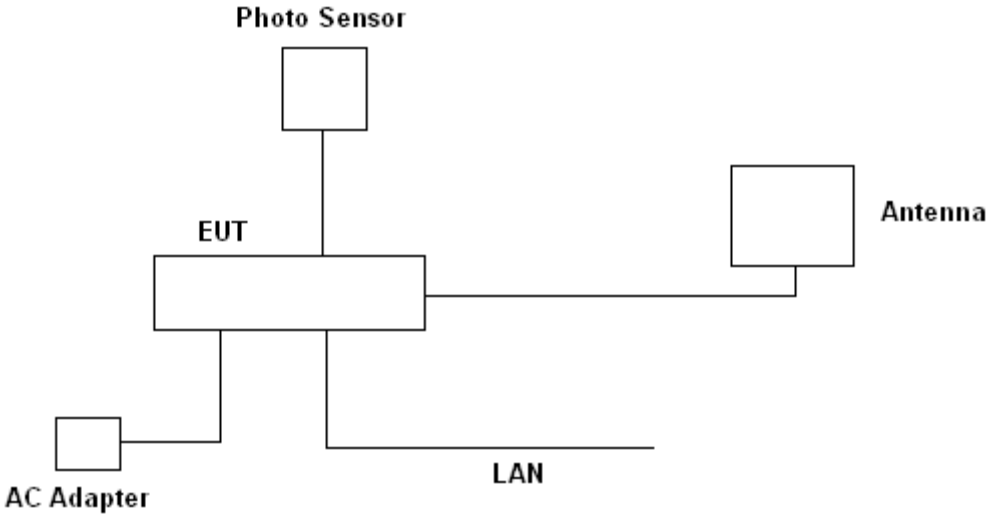
Description of E.U.T.

The HF1 is a 13.56 MHz RFID reader for industrial applications.

The HF1 reader is meant to be used with the following Element ID antennas:

1) ANT-2.5
2) ANT-0606S
3) ANT-4.5
4) ANT-1205R

System Diagram



Section 3. Field Strength of Emissions

NAME OF TEST: Field Strength of Emissions	PARA. NO.: 15.225(a)/(d)
TESTED BY: David Light	DATE: 26 March 2009

Minimum Standard: 15.225(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.

Test Data: See data on following pages.

Test Equipment: 1763-791-1783-1767-1733

Test Data – Field Strength of Emissions

Freq. (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Conversion (dB)	Corrected Reading (dBuA)	Spec. Limit (dBuA)	Pol.	Comments:
								6x12 antenna
13.56	67.4	16.7	1	0	85.1	124	Loop	
27.12	9	15.2	1	0	25.2	69.5	Loop	
								6x6 antenna
13.56	68	16.7	1	0	85.7	124	Loop	
27.12	9	15.2	1	0	25.2	69.5	Loop	
								2x2 antenna
13.56	54.5	16.7	1	0	72.2	124	Loop	
27.12	9	15.2	1	0	25.2	69.5	Loop	
								4x4 antenna
13.56	58.7	16.7	1	0	76.4	124	Loop	
27.12	9	15.2	1	0	25.2	69.5	Loop	

Analyzer Settings:

<30 MHz: RBW=VBW=10 kHz, Peak detector
>30 MHz: RBW=VBW=100 kHz, Peak detector

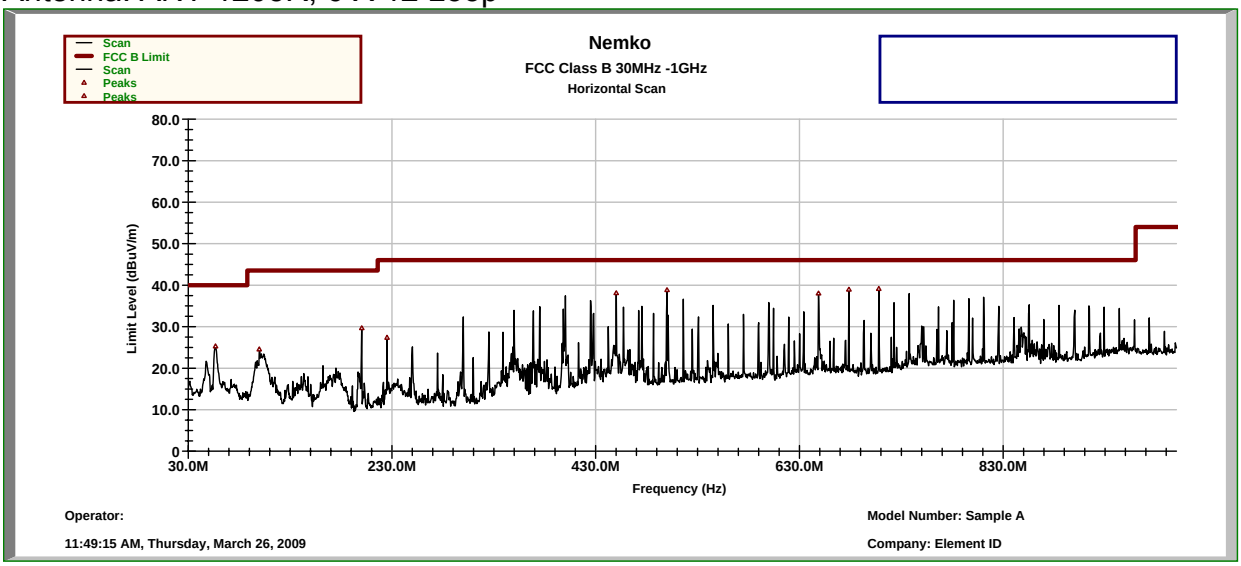
The spectrum was searched from 13 MHz to 1000 MHz.

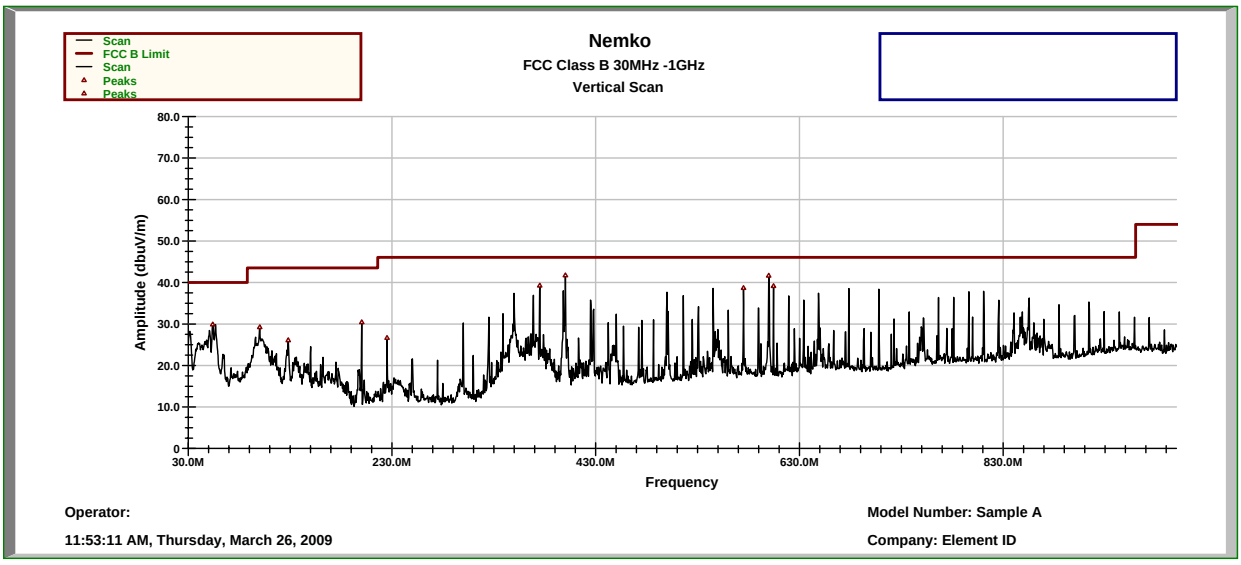
Measurement Distance: 3 meters

Note: The supply voltage was varied from 102 to 138 Vac with no fluctuation in carrier field strength.

Test Data – Field Strength of Emissions

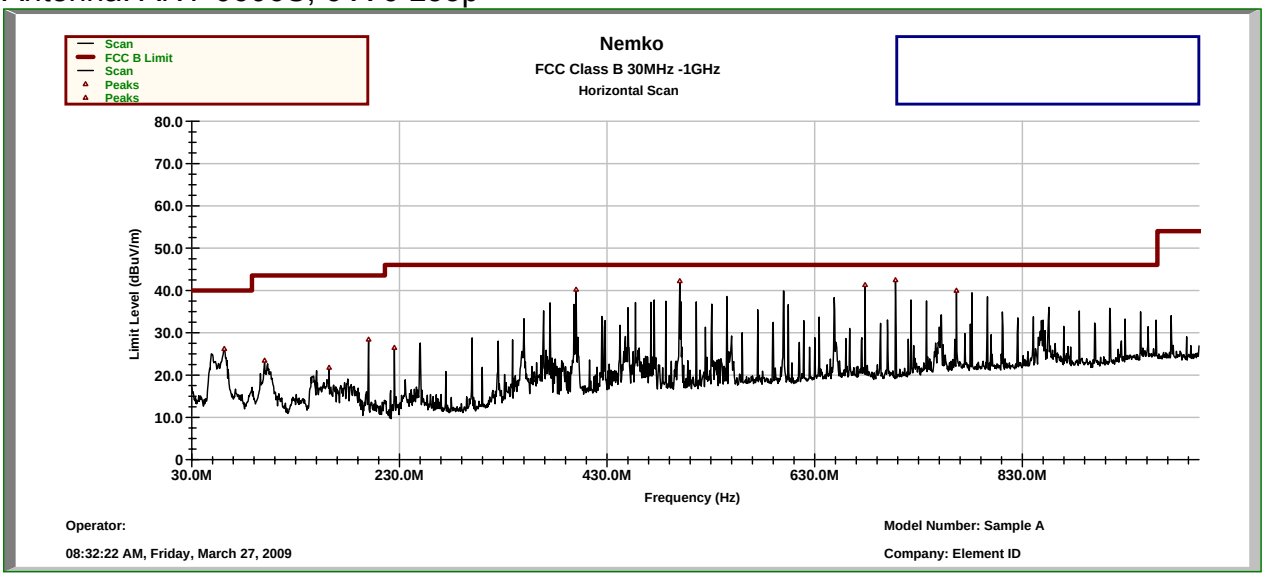
Antenna: ANT-1205R, 6 X 12 Loop

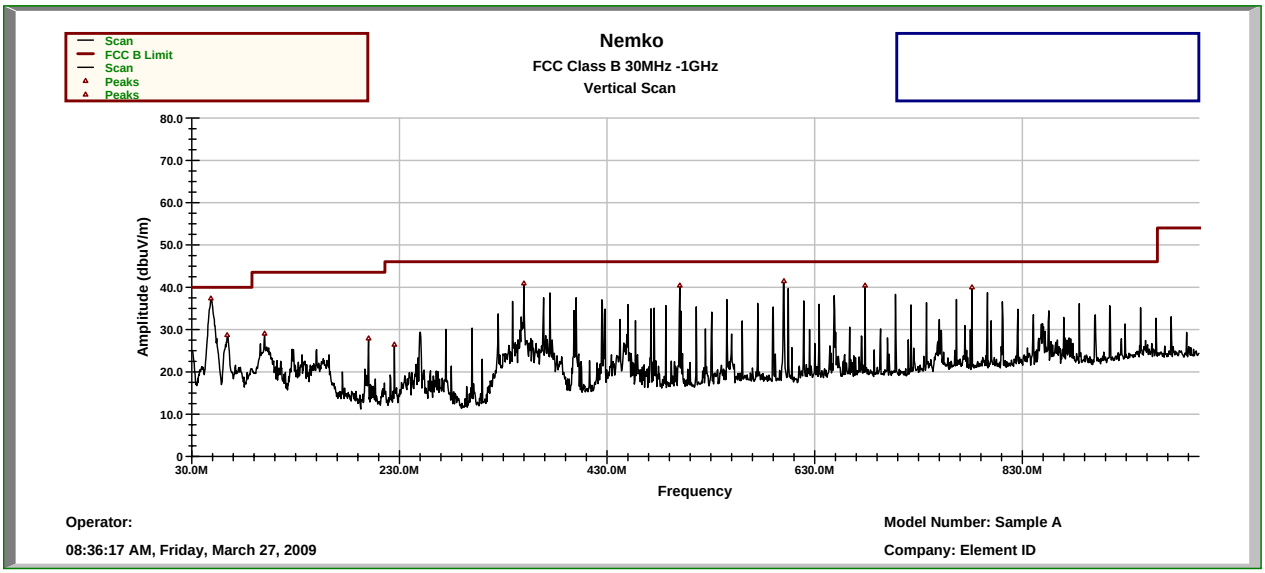




Test Data – Field Strength of Emissions

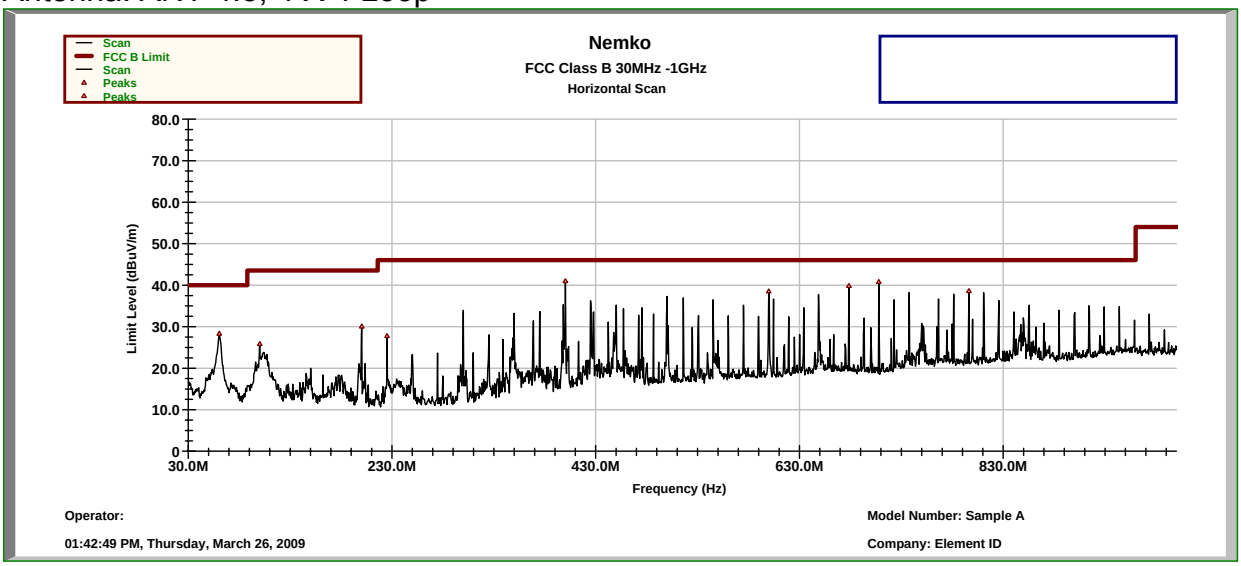
Antenna: ANT-0606S, 6 X 6 Loop

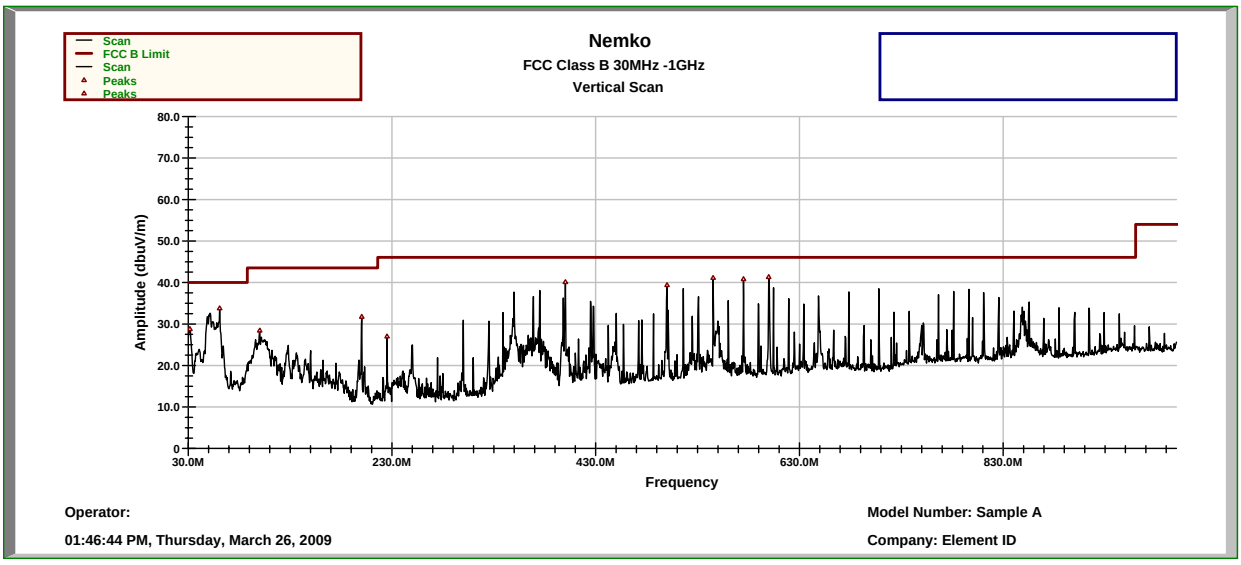




Test Data – Field Strength of Emissions

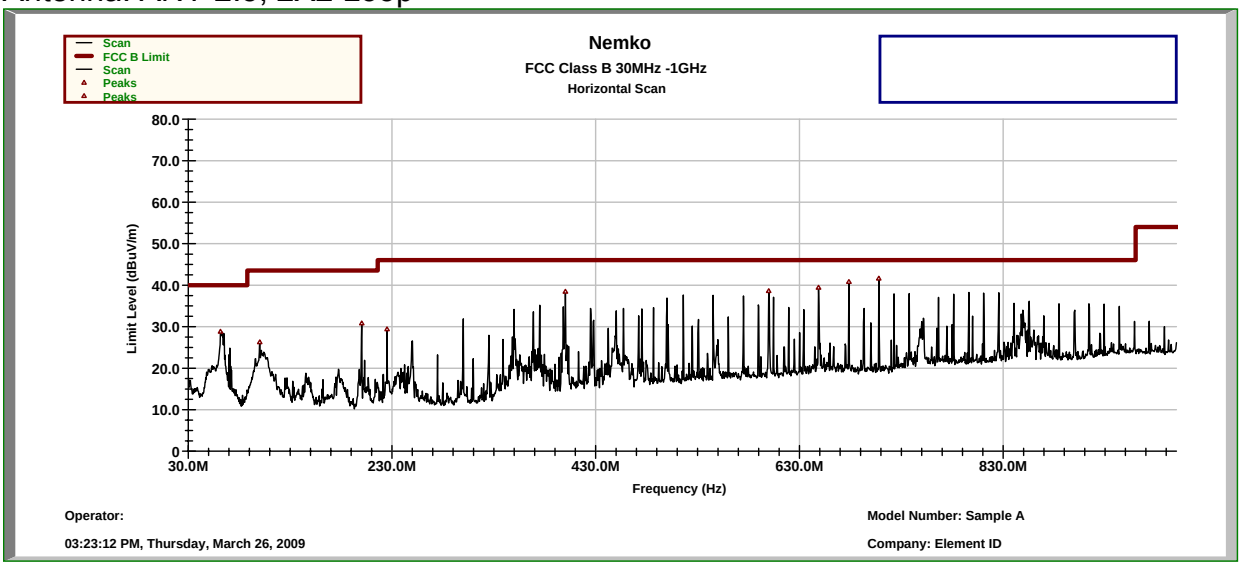
Antenna: ANT-4.5, 4 X 4 Loop

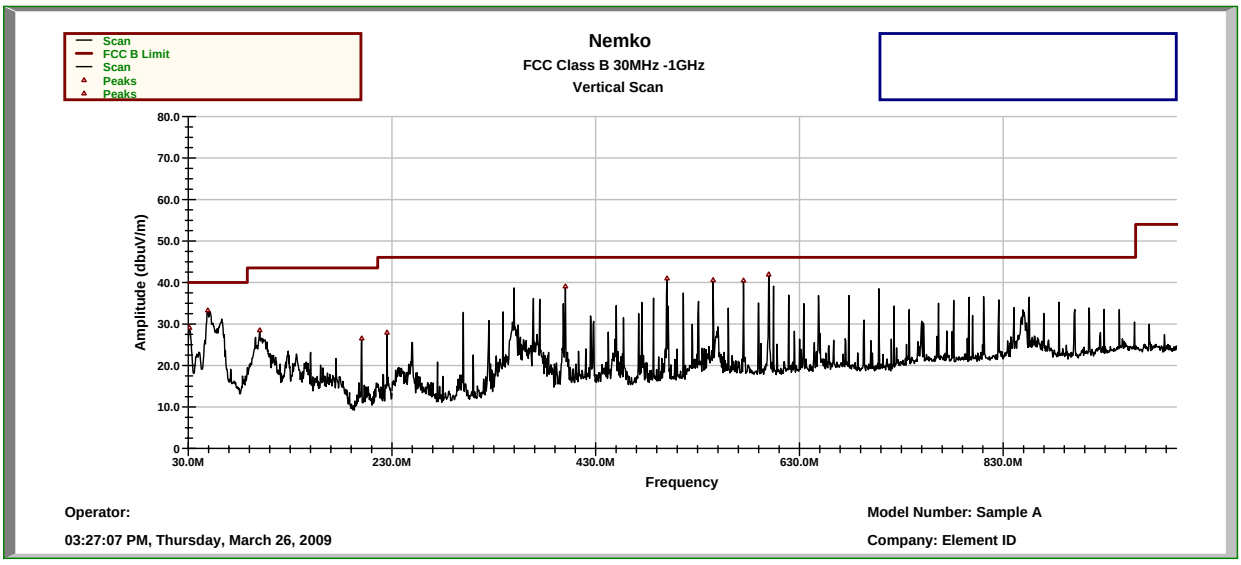




Test Data – Field Strength of Emissions

Antenna: ANT-2.5, 2X2 Loop





Section 4. Frequency Tolerance

NAME OF TEST: Frequency Tolerance	PARA. NO.: 15.231(d)
TESTED BY: David Light	DATE: 37 March 2009

Minimum Standard: 15.231(e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

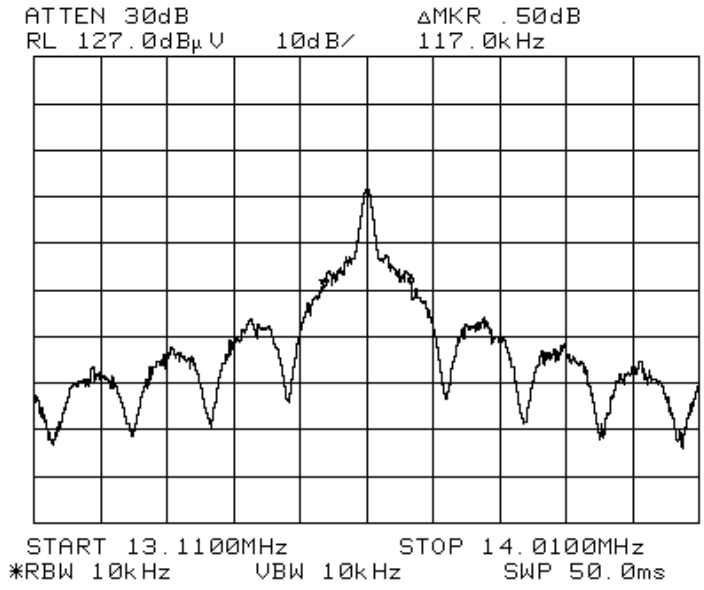
Test Results: Complies. .

Test Data: See attached data.

Test Equipment: 1659-802-1082-283

Test Data – Frequency Tolerance

Temp (°C)	Measured Frequency (MHz)		Test Voltage	Freqeuncy Error (Hz)	Limit (+/-Hz)		Comment
20	13.559700		120	-300	1356.0		
-20	13.559700		120	-300	1356.0		
50	13.559800		120	-200	1356.0		
20	13.559700		102	-300	1356		
20	13.559700		138	-300	1356		
Notes:							



Section 5. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY: David Light	DATE: 30 March 2009

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.

Test Results: Complies. .

Test Data: See attached graphs and table.

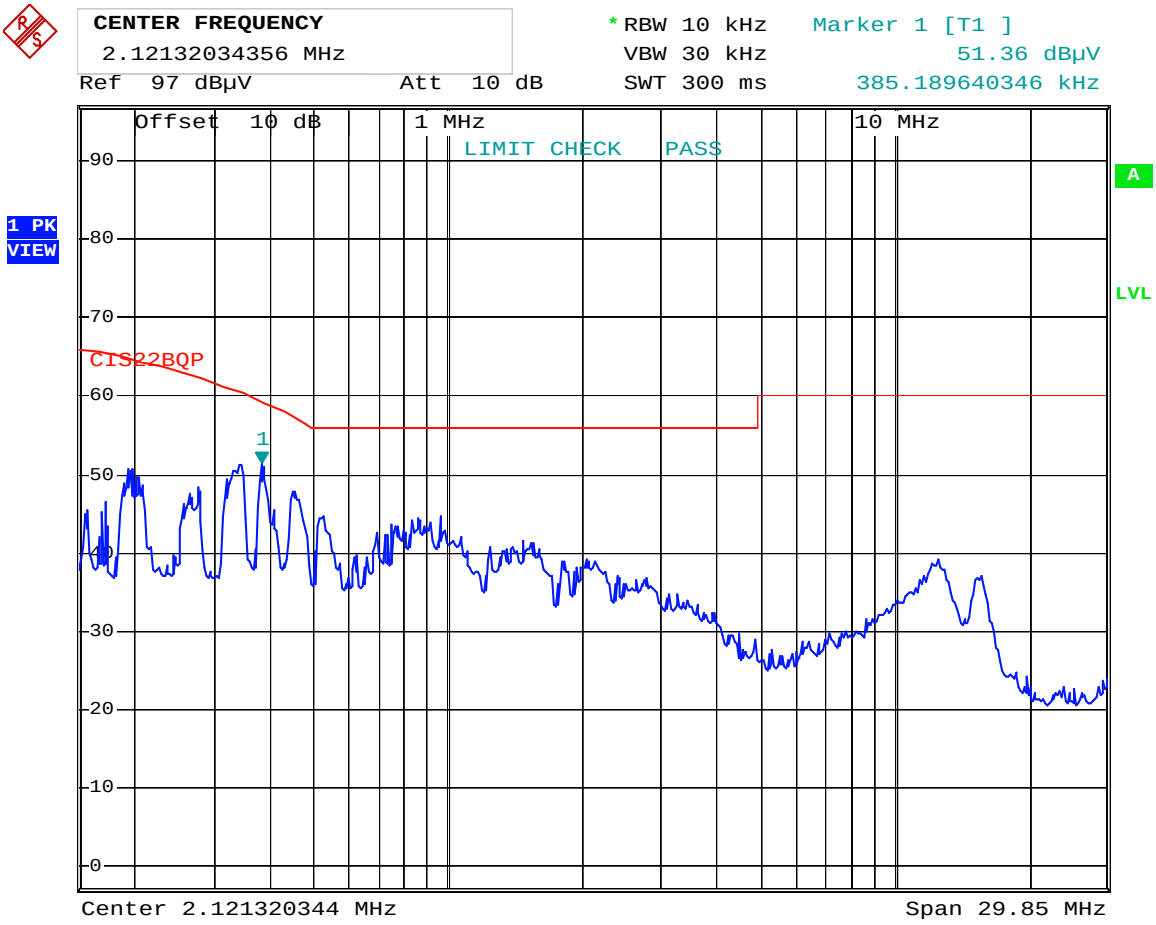
Test Equipment: 1663-1484-674-1188

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.

Tests Data – Powerline Conducted Emissions

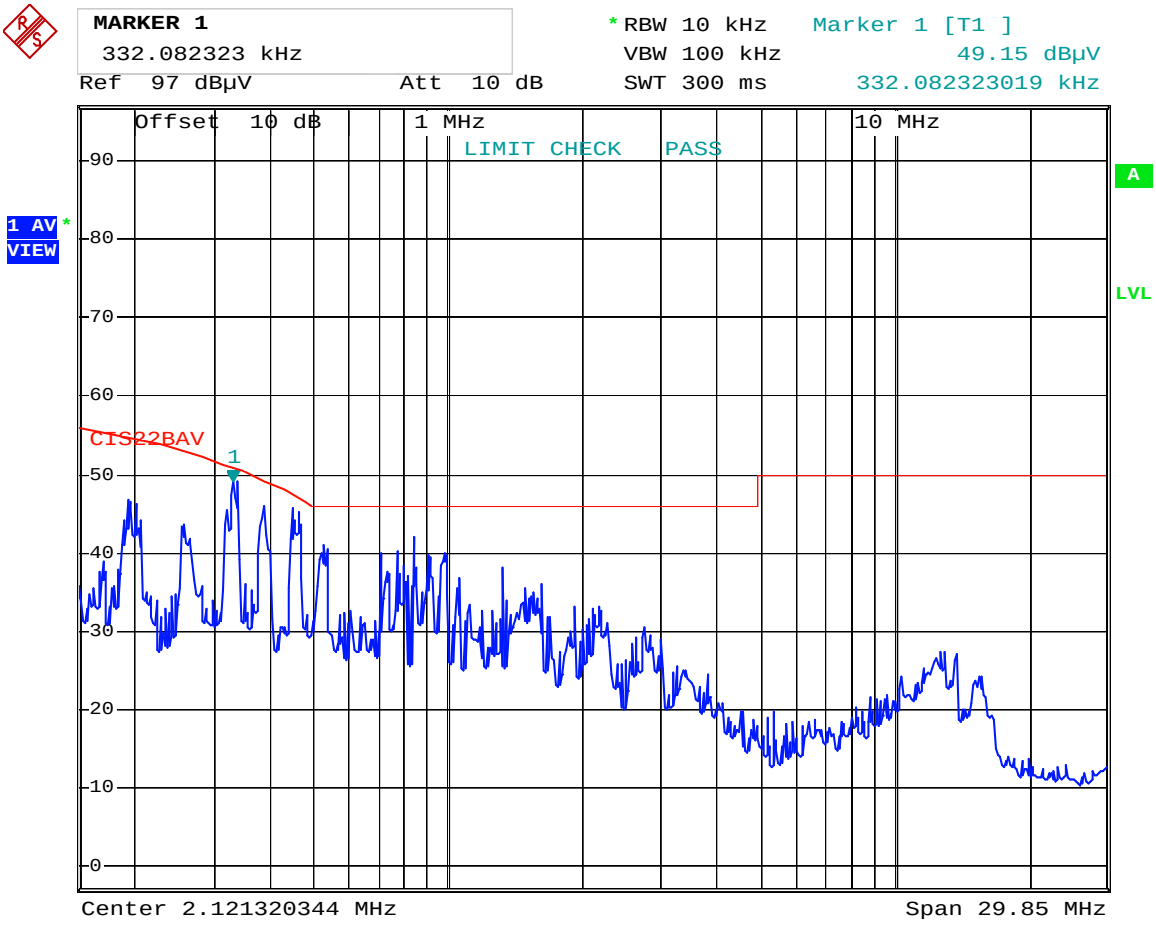
Hot Side



Date: 30.MAR.2009 10:10:08

Tests Data – Powerline Conducted Emissions

Hot Side



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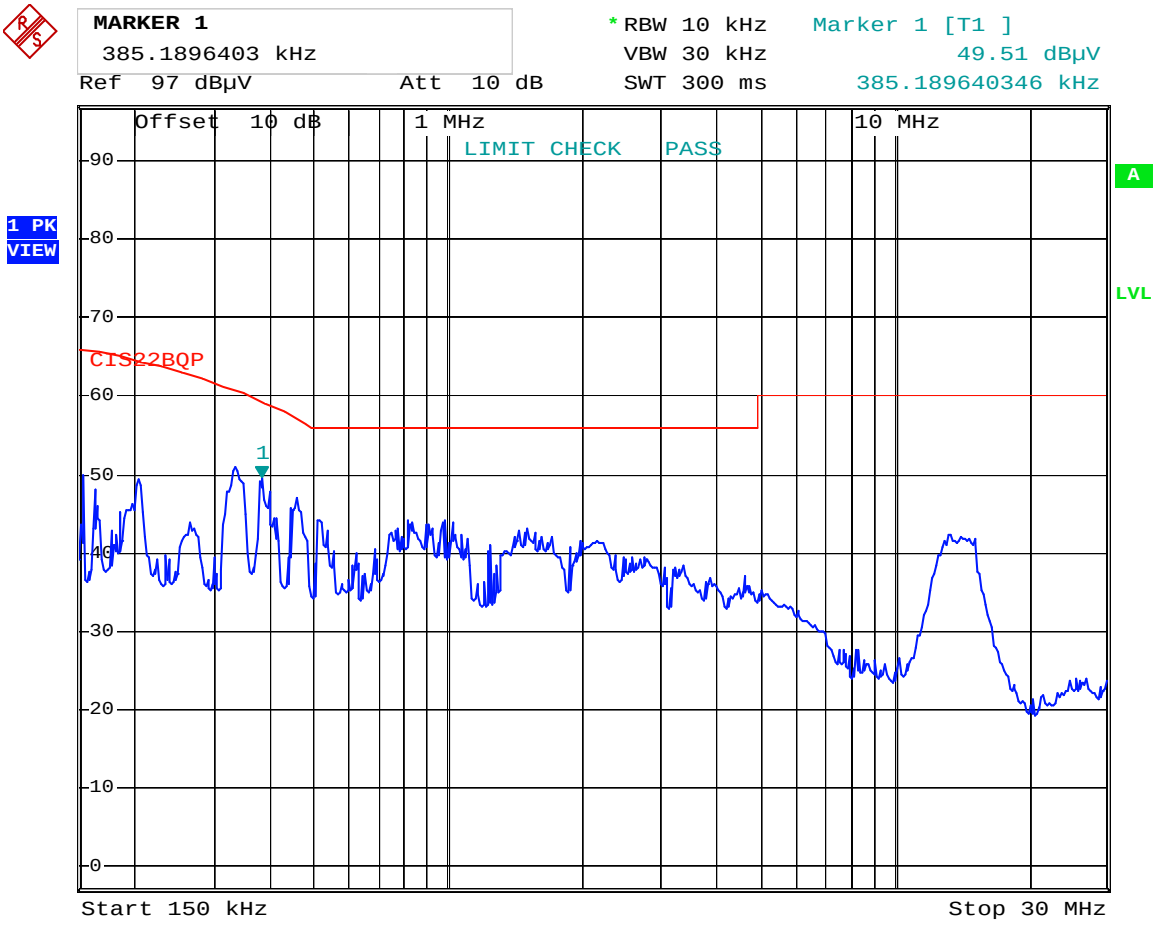
Tests Data – Powerline Conducted Emissions

Neutral Side



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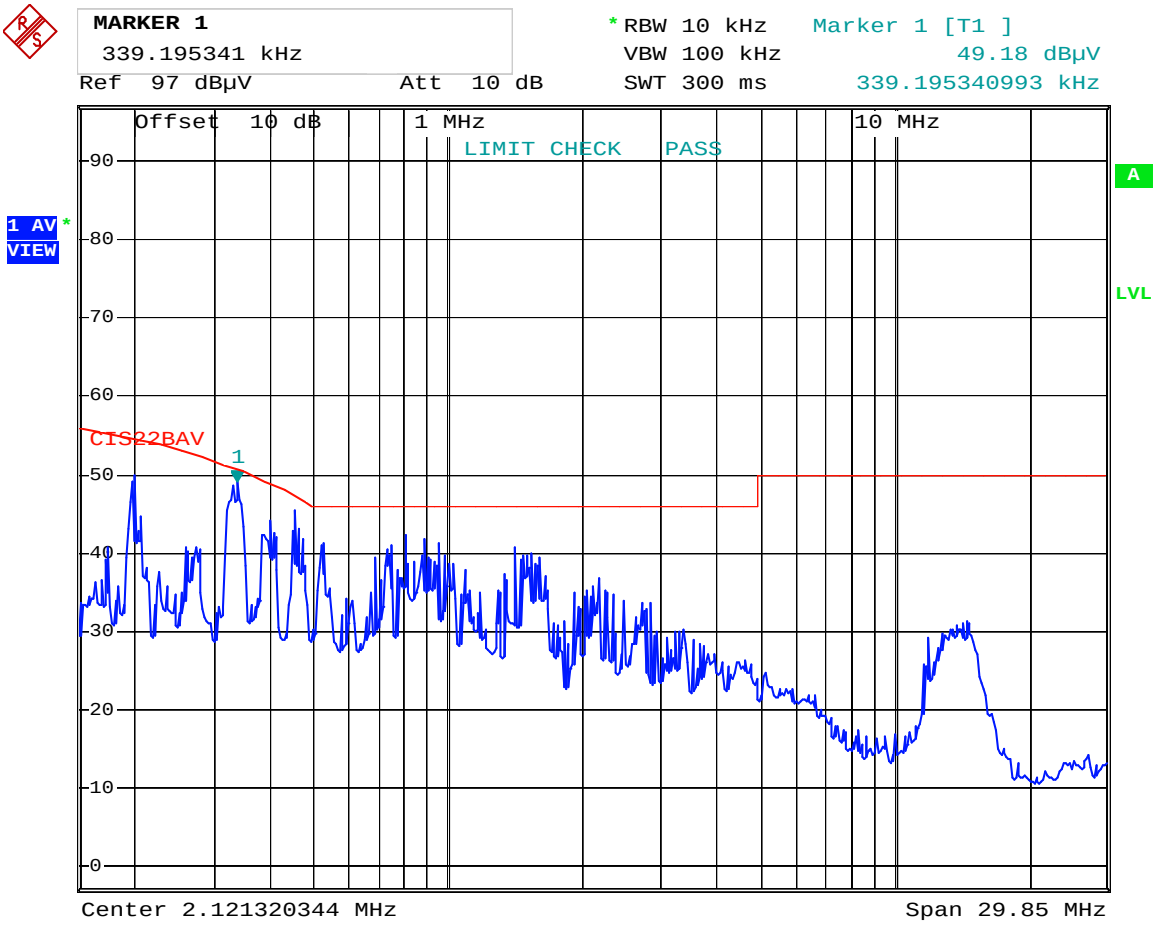
Tests Data – Powerline Conducted Emissions



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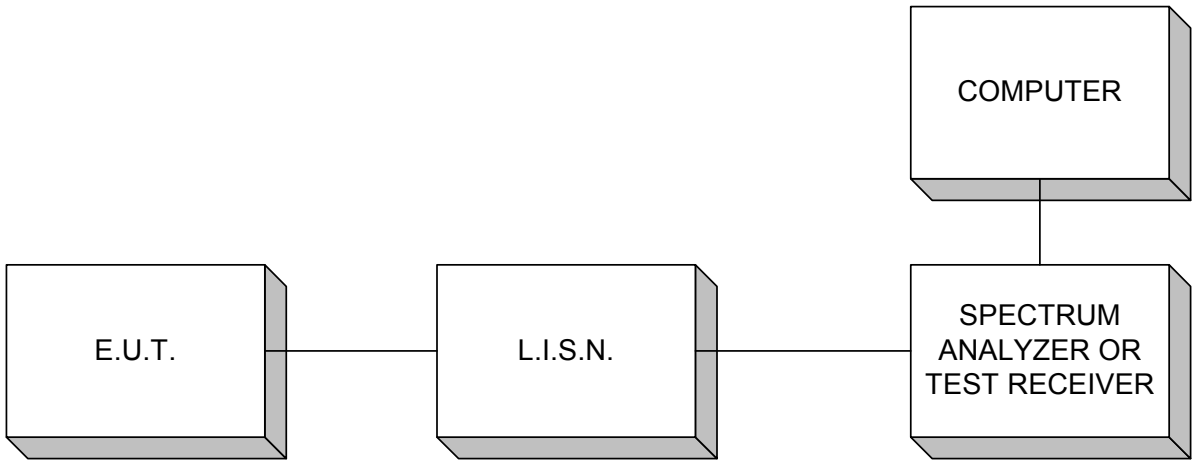
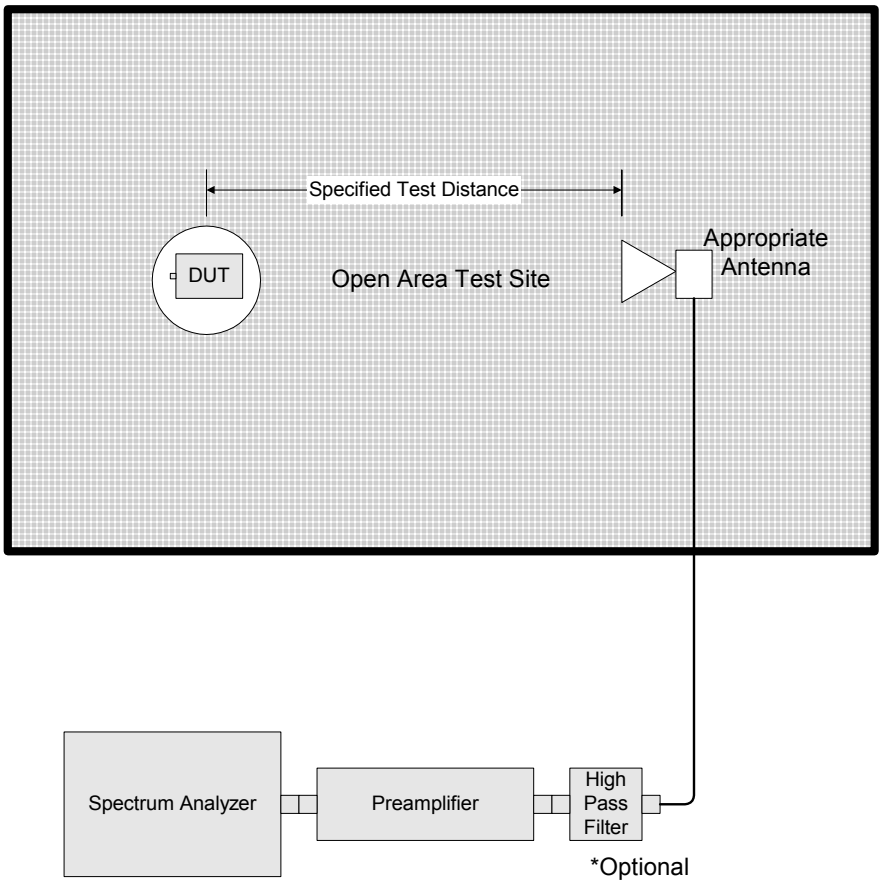
Section 6. Block Diagrams

Conducted Emissions



Outdoor Test Site For Radiated Emissions



Radiated Emissions 30 MHz - 1 GHz

The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.

Section 7. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1763	Bilog Antenna	Schaffner CBL 6111D	22926	11/04/08	11/04/09
1783	Cable	Nemko? 0	0	06/12/08	06/12/09
1767	EMI Test Receiver 20Hz - 26.5 GHz - 150 - +30 dBm LC	ROHDE & SCHWARZ ESIB26	837491/0002	09/20/07	09/19/08
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/07/08	05/07/09
1733	Active Loop	EMCO 6507	45939	06/11/08	06/11/09
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	04/24/08	04/24/09
802	Near Field Probe Set	EMCO 7405	103	N/A	N/A
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A
674	LIMITER	HP 11947A	3107A02200	04/19/06	04/19/07
1663	Spectrum Analyzer	Rhode & Schwarz FSP3	100073	06/03/08	06/03/09
1188	LISN	EMCO 3825/2	1214	07/22/08	07/22/09