Test Report for Unlicensed Low Power Transmitter

FCC Applicable Rule Parts: 15.205, 15.207, 15.209
Industry Canada Applicable Rule Parts: RSS-Gen, RSS-210

Applicant: Keri Systems Inc.
2305 Bering Drive
San Jose, CA 95131

FCC ID: N42KERINXT5R
IC: 4579A-KERINXT5R
Model Nos.: NXT-1R, NXT-3R, NXT-5R

Description of device:

The Keri Systems readers, cards, and tags are low frequency, non-contact, identification solutions based upon the latest techniques in radio frequency identification (RFID).

The proximity reader has a receiver circuit, a microprocessor, and a 125kHz exciter circuit that includes a magnetic coil. The tags and cards that are read by the reader have a highly reliable radio frequency integrated circuit (RFIC), attached to a magnetic coil inside a durable, environmentally secure plastic housing.

Each model has the same radio printed circuit board, The only differences among the models is the antenna coil size and the size and shape of the plastic enclosure.
Worst-case emissions are obtained from the highest powered unit, model NXT-5R, with the largest antenna coil.

TEST REQUIREMENTS

The referenced device is subject to certification under Part 2 of FCC Rules. The specific emissions limits and test requirements are found in Part 15 of FCC Rules. In addition to the device specific requirements listed in 15.209 (re-printed below), the following Part 15 requirements are universal to all unlicensed transmitters and would also apply:

15.19 Labeling requirements
15.20 Accessories
15.21 Information to user
15.31 Measurement standards
15.33 Frequency range of measurements
15.35 Measurement detector functions and bandwidths
15.109 Radiated Emissions (unintentional radiators)
15.203 Antenna requirement
15.204 External radio frequency power amplifiers and antenna modifications.
15.205 Restricted bands of operation.

15.207 Conducted limits
15.209 Radiated emission limits, general requirements.

TEST PROCEDURES

Measurements were performed per the following standard, with the exception that a loop antenna was used for radiated emissions measurements below 30 MHz .

ANSI 63.4: 2003 : Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

REVISION INFORMATION AND ATTESTATION OF RESULTS
Report No: 07PR017FCC

REV No.	Description	Revised By:	Date
-	Original Issue	T. Cokenias	9/27/2009
1	Include test standard reference Include tabulated test data	T. Cokenias	10/18/2009

FCC ID: N42KERINXT5R meets all FCC requirements for a device of this type.

THOMAS N. COKENIAS 18 October 2009

EMC and Radio Regulatory Consultant
Agent for Keri Systems Inc.

15.205 Restricted bands of operation.

Only spurious emissions are permitted in any of the frequency bands listed below: The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209.

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
10.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

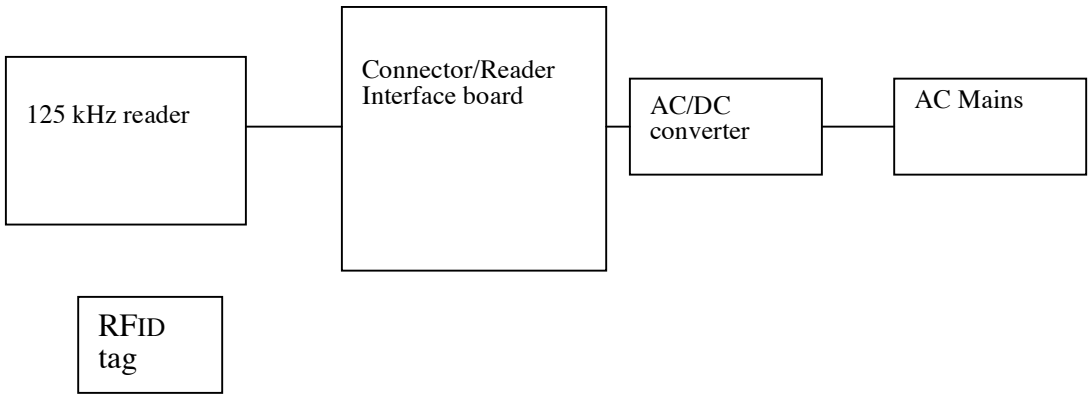
15.209 Radiated emission limits, general requirements.

Except as provided elsewhere in this paragraph the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength uV/m	Measurement distance, m
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

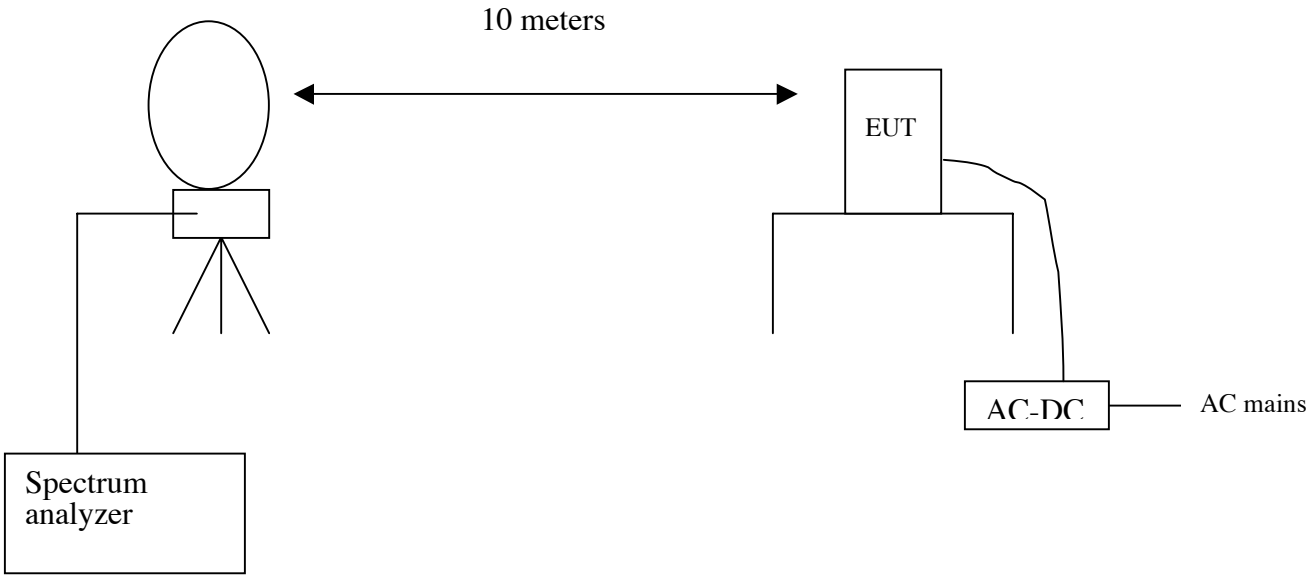
Test Set-up Diagram



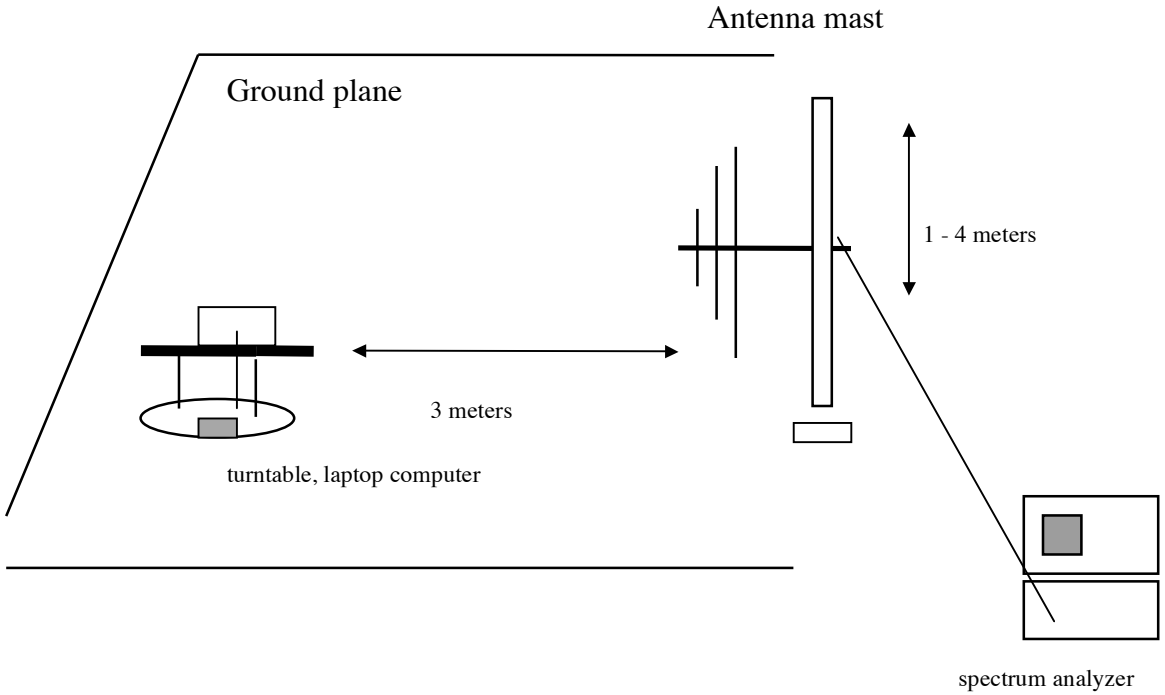
Test Equipment List

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset Number**	**Cal Due**
Receiver	HP	8542E	C00957	9/18/09
Receiver RF Filter Section	HP	85420	C00958	09/18/09
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	01/14/10
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	12/16/09
Loop Antenna	EMCO	6502	9202-2722	9/16/10
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	02/04/10
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/06/09
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/29/09
LISN, 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/29/09

15.205 and 15.209 Radiated Emissions
Radiated Test Set-up, 0.125 - 30MHz



15.205 and 15.209 Radiated Emissions
Radiated Test Set-up, 30 - 1000 MHz



Test Procedures, 0.125 – 30 MHz

The EUT was placed on a non-conductive table located on a large open grassy area free of nearby metal obstructions. The loop antenna was placed at a location 10m from the EUT. Radiated emissions were measured with the loop antenna both parallel and perpendicular to the plane of the EUT loop antenna.

Test Procedures, 30 -1000 MHz

The EUT was placed on a turntable in a 5m anechoic chamber. The EUT was set to normal operating conditions (constantly transmitting). Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4. Because the EUT is DC operation only, the EUT was run off a 12V battery so that low frequency (30-100 MHz) emissions from an AC/DC converter would not contaminate test results.

Test Results

EUT emissions are below noise floor or at least 6 dB below 15.209 limits.

Radiated Emissions, 0.125 – 30 MHz

FCC Part 15, Subpart B & C **10 Meter Distance Measurement At Open Field**

Company: Keri Systems
Project #: 09U12643
Model #:NXT5R
Tester: Doug Anderson
Date: 06/08/09

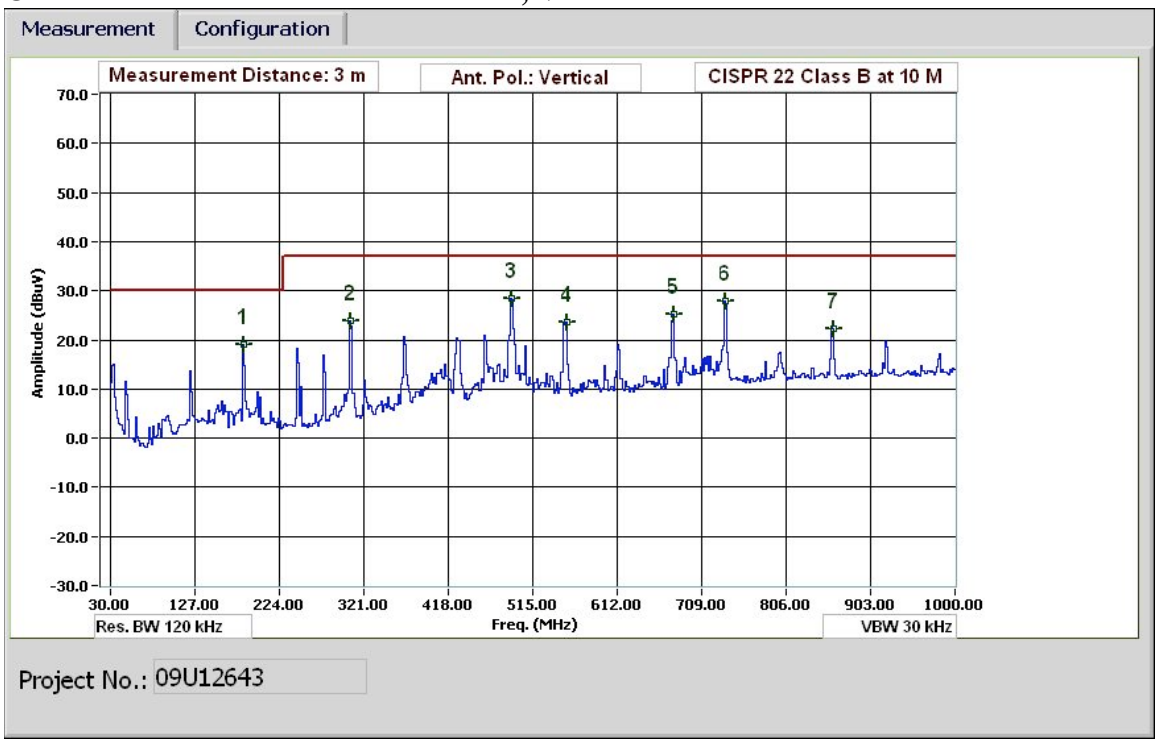
Frequency (MHz)	PK (dBu/V)	QP (dBu/V)	AV (dBuV)	AF dB/m	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes
Loop Antenna Face On:												
0.125	47.43		N/A	10.481	-19.08	38.83	N/A	50.48	N/A	-11.7	N/A	Fundamental @ 10m Dist
Loop Antenna Face Off:												
0.125	35.89		N/A	10.481	-19.08	27.29	N/A	50.48	N/A	-23.2	N/A	Fundamental @ 10m Dist

* No more emissions were found up to 30MHz

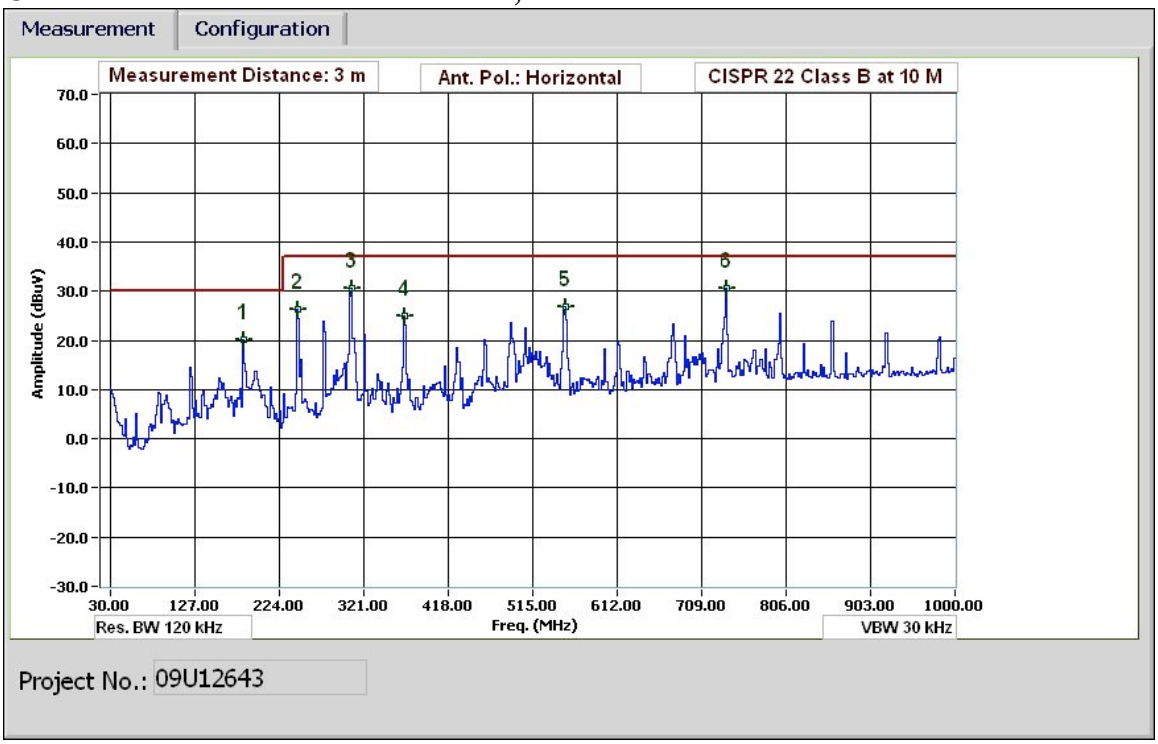
Note: The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 10000Mhz. Radiated emission limits in these three bands are based on measurements employing an average detector.

P.K. = Peak
Q.P. = Quasi Peak Readings
A.F. = Antenna factor

Out of Band emissions: 30-1000 MHz, Vertical



Out of Band emissions: 30-1000 MHz, Horizontal



30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Doug Anderson
Date: 06/08/09
Project #: 09U12643
Company: Keri Systems
EUT Description: 125kHz Card Reader
EUT M/N: NXT5R
Test Target: EN55022 Class B
Mode Oper: Continuous Tx

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant. High cm	Table Angle Degree	Notes
Vertical:															
183.583	**3.0**	**45.4**	**11.2**	**1.2**	**28.2**	**-10.5**	**0.0**	**19.1**	**30.0**	**-10.9**	**V**	**P**	**1-4m**	**0-360**	
306.45	**3.0**	**47.5**	**13.5**	**1.5**	**28.1**	**-10.5**	**0.0**	**24.0**	**37.0**	**-13.0**	**V**	**P**	**1-4m**	**0-360**	
490.75	**3.0**	**48.2**	**16.6**	**2.0**	**27.8**	**-10.5**	**0.0**	**28.5**	**37.0**	**-8.5**	**V**	**P**	**1-4m**	**0-360**	
553.8	**3.0**	**41.9**	**17.6**	**2.1**	**27.7**	**-10.5**	**0.0**	**23.6**	**37.0**	**-13.4**	**V**	**P**	**1-4m**	**0-360**	
676.667	**3.0**	**41.1**	**19.3**	**2.4**	**27.3**	**-10.5**	**0.0**	**25.1**	**37.0**	**-11.9**	**V**	**P**	**1-4m**	**0-360**	
736.483	**3.0**	**43.0**	**20.1**	**2.5**	**27.3**	**-10.5**	**0.0**	**27.8**	**37.0**	**-9.2**	**V**	**P**	**1-4m**	**0-360**	
860.967	**3.0**	**36.2**	**21.5**	**2.7**	**27.7**	**-10.5**	**0.0**	**22.4**	**37.0**	**-14.6**	**V**	**P**	**1-4m**	**0-360**	
Horizontal:															
183.583	**3.0**	**46.5**	**11.2**	**1.2**	**28.2**	**-10.5**	**0.0**	**20.2**	**30.0**	**-9.8**	**H**	**P**	**1-4m**	**0-360**	
245.017	**3.0**	**51.8**	**11.8**	**1.3**	**28.2**	**-10.5**	**0.0**	**26.3**	**37.0**	**-10.7**	**H**	**P**	**1-4m**	**0-360**	
308.067	**3.0**	**54.0**	**13.5**	**1.5**	**28.1**	**-10.5**	**0.0**	**30.5**	**37.0**	**-6.5**	**H**	**P**	**1-4m**	**0-360**	
367.883	**3.0**	**47.3**	**14.4**	**1.7**	**28.1**	**-10.5**	**0.0**	**24.9**	**37.0**	**-12.1**	**H**	**P**	**1-4m**	**0-360**	
552.183	**3.0**	**45.3**	**17.6**	**2.1**	**27.7**	**-10.5**	**0.0**	**26.9**	**37.0**	**-10.1**	**H**	**P**	**1-4m**	**0-360**	
738.1	**3.0**	**45.6**	**20.1**	**2.5**	**27.3**	**-10.5**	**0.0**	**30.5**	**37.0**	**-6.5**	**H**	**P**	**1-4m**	**0-360**	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

AC Line Conducted Emissions
Test Requirement: 15.107, 15.207

Test Set-up

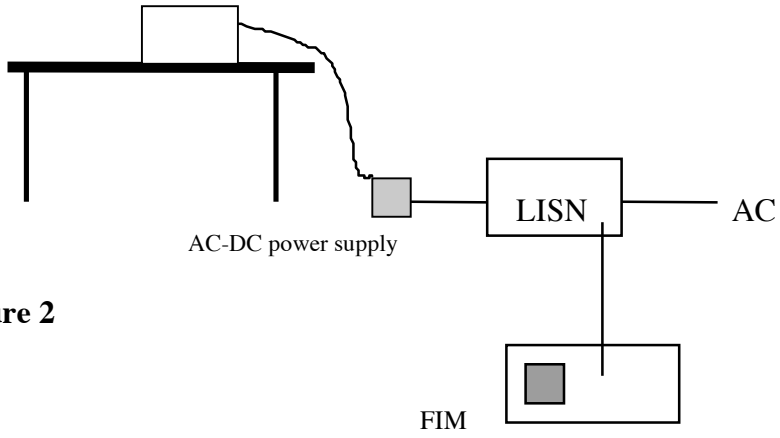


Figure 2

Test Procedure

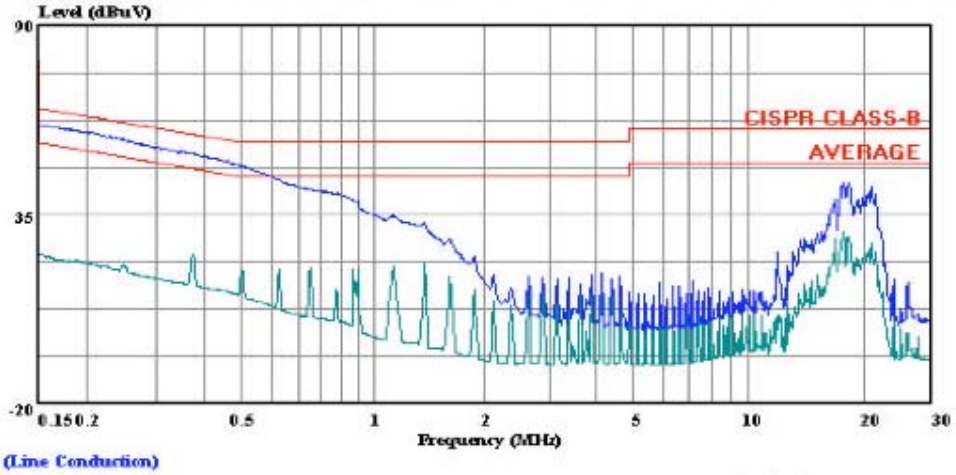
1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in normally.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

Test Results

PASS. Refer to data plot below.

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: 09U12643LC.EMI Date: 06-08-2009 Time: 09:46:07



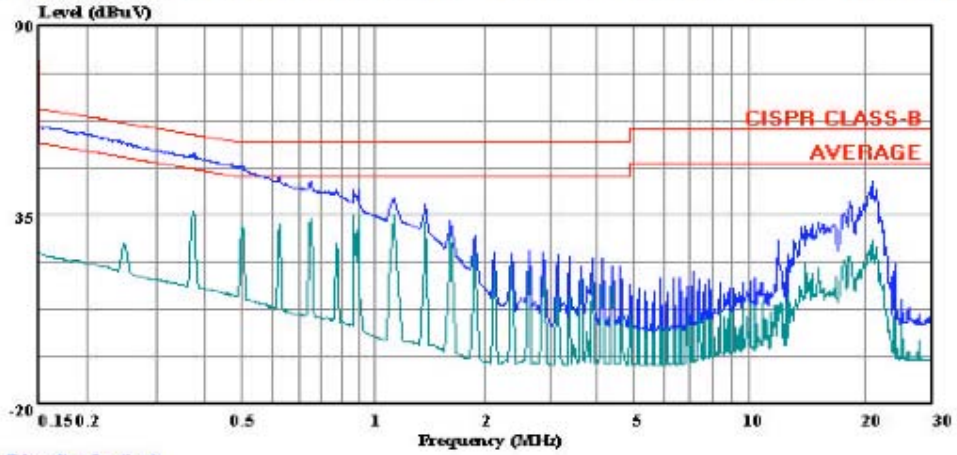
(Line Conduction)

Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Doug Anderson
Project #: : 09U12643
Company: : Kerry
EUT Description:: 125kHz Card Reader
Mode: : Continuous Tx
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L1: Peak (Blue) , Average (Green)

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: 09U12643LC.EMI Date: 06-08-2009 Time: 09:59:35



(Line Conduction)

Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Doug Anderson
Project #: : 09U12643
Company: : Kerry
EUT Description:: 125kHz Card Reader
Mode: : Continuous Tx
Target: : FCC Class B
Voltage: : 115VAC / 60Hz
: L2: Peak (Blue) , Average (Green)

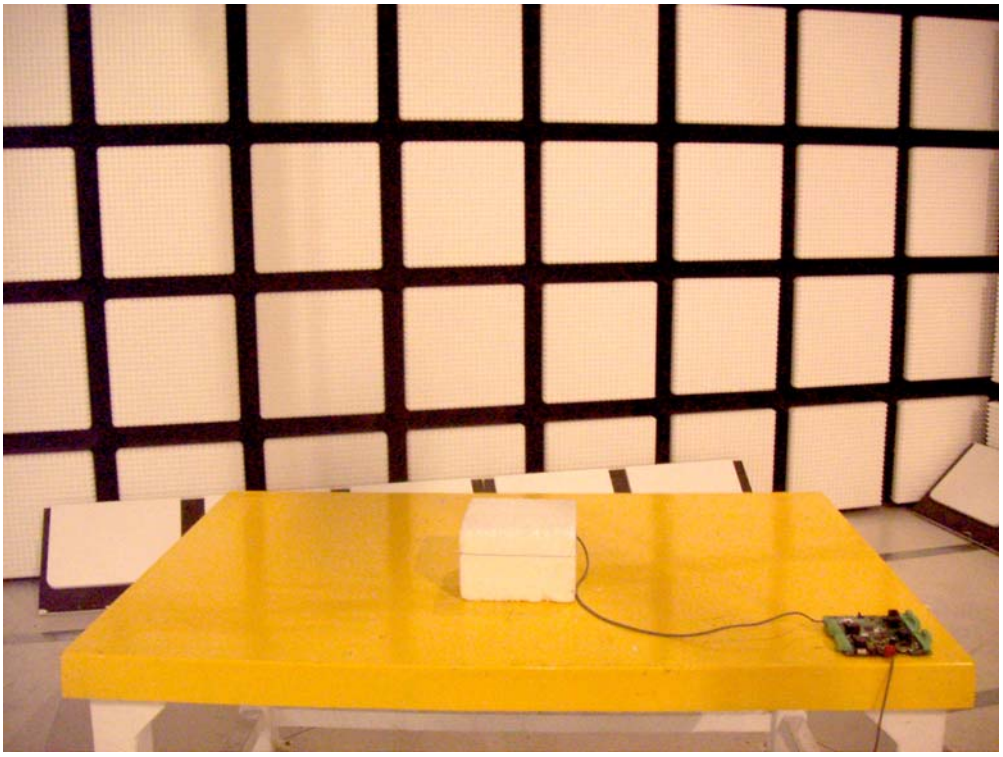
AC Line Conducted Tabulated Data

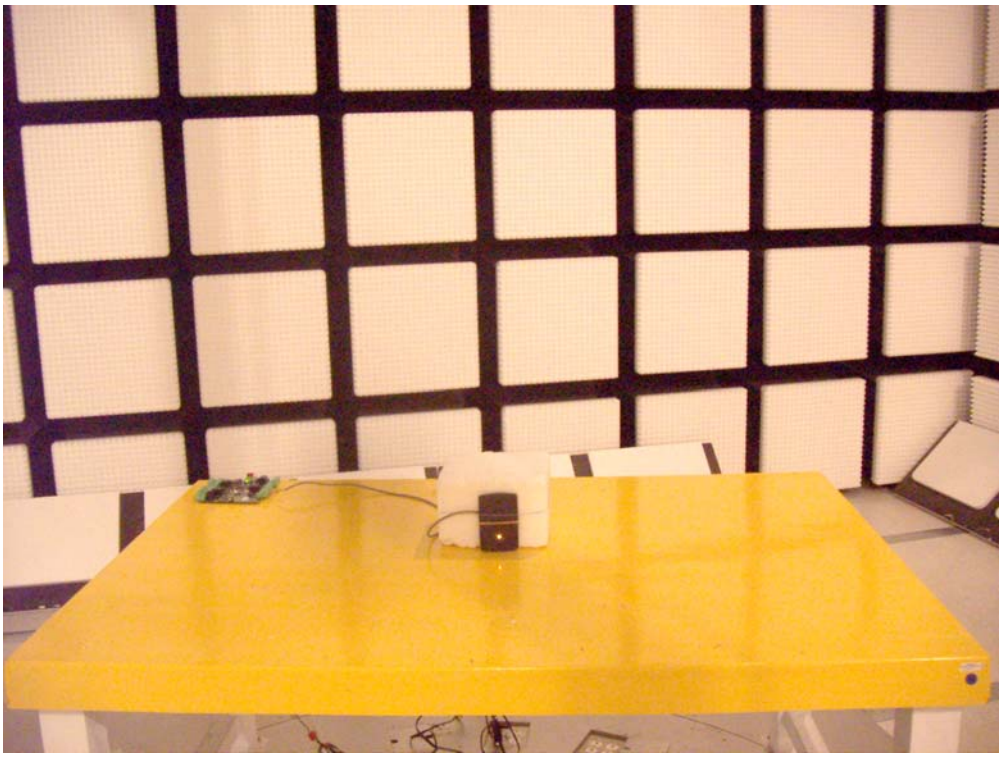
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.20	58.85	--	20.75	0.00	63.57	53.57	-4.72	-32.82	L1
0.37	52.69	--	23.45	0.00	58.43	48.43	-5.74	-24.98	L1
0.50	49.24	--	19.27	0.00	56.02	46.02	-6.78	-26.75	L1
0.20	58.40	--	21.08	0.00	63.57	53.57	-5.17	-32.49	L2
0.37	52.93	--	36.10	0.00	58.43	48.43	-5.50	-12.33	L2
0.50	49.06	--	31.69	0.00	56.02	46.02	-6.96	-14.33	L2
6 Worst Data									

Test Set-Up Photographs

Radiated emissions below 30 MHz

Radiated Emissions, 30 – 1000 MHz

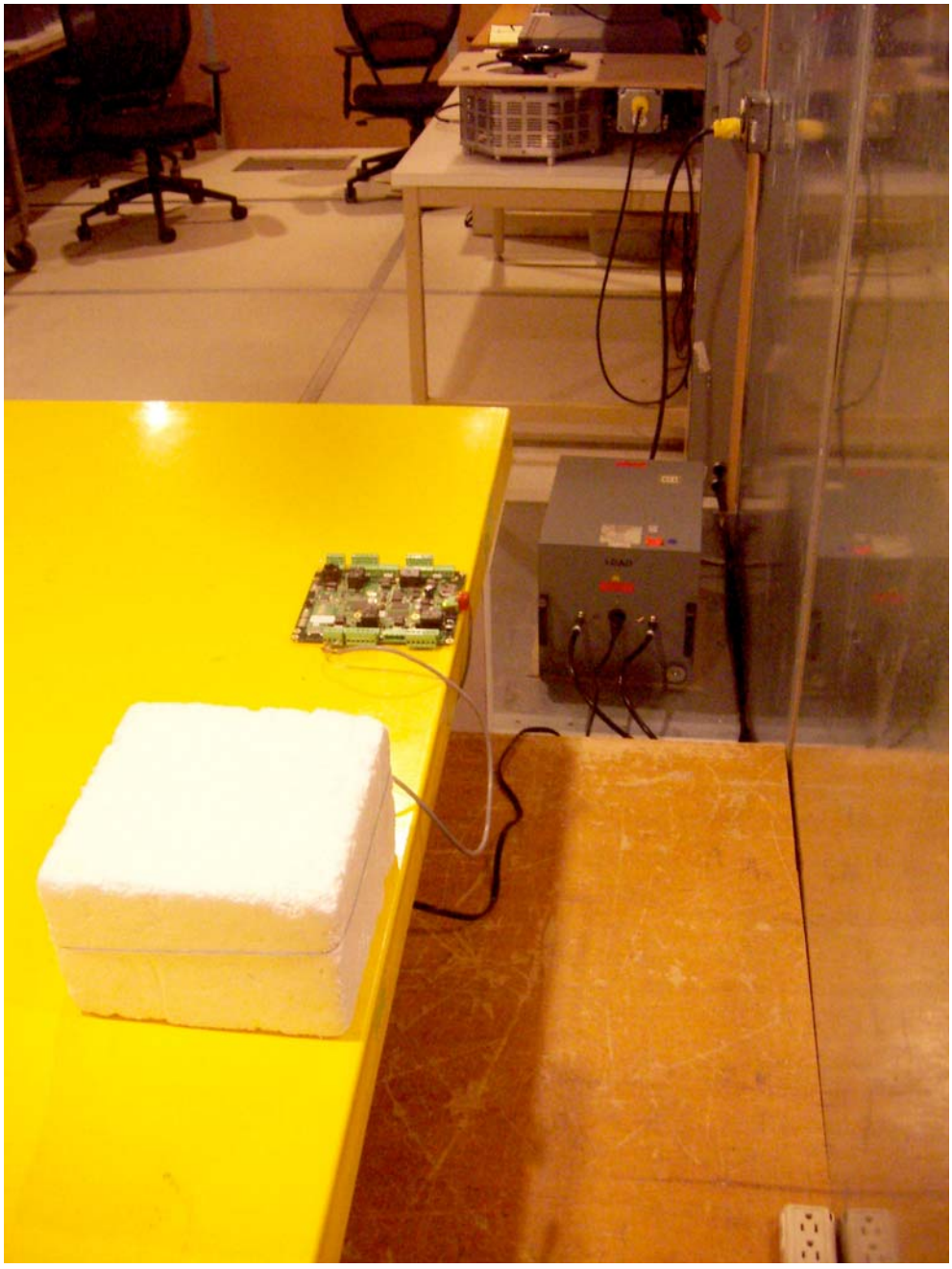




AC Line Conducted Emissions

Front View

Side View



END OF REPORT