



# ***ELECTROMAGNETIC INTERFERENCE TEST REPORT***

*Report Number: 2751-1*

*Report Date: 12/05/07*

*Applicable Specification:*

*47 CFR Part 15, Subpart C, Section 15.225*

*Industry Canada RSS-210 Issue 7*

*Certification of a Class B RFID Card Reader*

***FCC ID: MBPSCR331-DI21B***

***IC: 7485A-331DI21B***

*Equipment under Test:* ***RFID Card Reader***  
*Model Number:* ***SCR 331DI-DTC***  
*Serial Number:* ***001***

*Prepared for:* ***SCM Microsystems***  
***41470 Christy Avenue***  
***Fremont, CA 94538***

*Tested by:* ***Bob Cole***

*Prepared by:* ***Bob Cole***  
***EMCE Engineering, Inc.***  
***44366 S. Grimmer Blvd.***  
***Fremont, CA 94538***  
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*Note:*

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## *Disclaimer*

*EMCE Engineering, Inc., assumes no responsibility for the continuing validity of test data when the Equipment under Test is not under the continuous physical control of EMCE. The signature below attests to the fact that all measurements reported herein were performed by myself or were made under my supervision, and are correct to the best of my knowledge and belief as of the date specified. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Tests were conducted by qualified EMCE Engineering, Inc. personnel utilizing test equipment maintained in a “current” state of calibration with traceability to NIST.*

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- *This report or certificate shall not be reproduced except in full without the written approval of the issuer.*

## ***1.0 SCOPE***

*This test report describes the equipment setup, test methods employed and results obtained during electromagnetic interference (EMI) testing of a Class B RFID Card Reader as defined in Part 15, Subpart A, paragraph 15.3 (o). The tests described herein measured the RF radiated (RFI Field Strength) emissions of the equipment under test (EUT) as installed in a typical “Host” environment. The tests conformed to the measurement and test site requirements of ANSI C63.4-2003.*

### ***1.1 Objective***

*The tests described herein were performed to establish that the EUT is capable of compliance with the requirements of Part 15, Subpart B, Section 15.225 for Intentional Radiators (a Class B RFID Card Reader).*

### ***1.2 Description of EUT***

*The EUT is a **RFID Card Reader** Model Number: **SCR 331DI-DTC** Serial Number: **001**, manufactured by SCM Microsystems. The EUT contained the following options: No Options.*

### ***1.3 Results/Modifications***

*The EUT passed FCC Class B conducted and radiated emissions tests. No modification was necessary. The manufacturer may declare the EUT as complying with the FCC requirements.*

## **1.4 Test Limits**

*In accordance with paragraph CFR 47, 15.207 and 15.209. emissions.*

## **2.0 APPLICABLE DOCUMENTS**

### **2.1 FCC Documents**

#### **Document**

#### **Title**

*Title 47 CFR*

*TELECOMMUNICATION*

*Part 2*

*Frequency Allocations and Radio Treaty Matters;  
General Rules and Regulations.*

*Part 15*

*Radio Frequency Devices.*

### **2.2 Other Documents**

*ANSI C63.4-2003*

*American National Standards for Methods of  
Measurement of Radio-Noise Emissions From  
Low-Voltage Electrical and Electronic Equipment  
In the Range of 9kHz to 40GHz.*

*CISPR 22: 2006*

*Information technology equipment – Radio disturbance  
characteristics – Limits and methods of measurement.  
By the International Electrotechnical Commission  
(IEC).*

### **3.0 GENERAL SETUP AND TEST CONDITIONS**

#### **3.1 Test Facility**

*The tests described herein were performed at:*

*EMCE Engineering, Inc.  
44366 S. Grimmer Blvd.  
Fremont, CA 94538*

*This laboratory has one semi-anechoic chamber, one electromagnetic shielded enclosure and a 3-meter and 10-meter Open Area Test Site (OATS). A computer controlled spectrum analyzer with quasi-peak adapter, and printer were used for gathering and recording test data. Figure 1 shows the test site layout for conducted and radiated measurements.*

#### **3.2 Description of Open Area Test Site (OATS)**

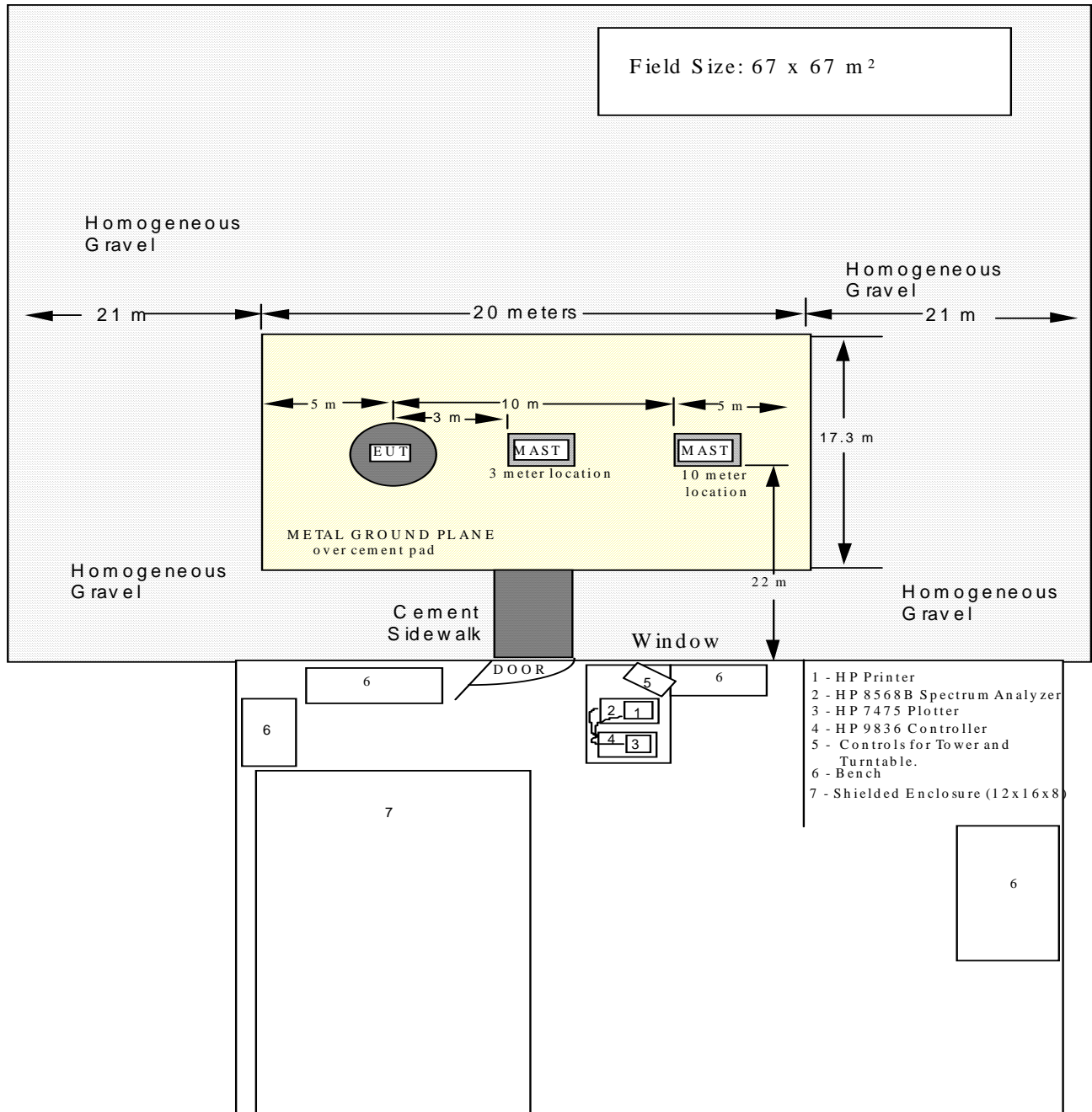
*The 3 and 10 meter site is located out-of-doors in an open field whose size is 212 feet long by 206 feet wide. The dimensions of the test area are 66 feet wide by 59 feet long (20m x 18m). The description of the 3 and 10-meter site is on file with the FCC according to the requirements of Part 2.948.*

#### **3.3 Site Attenuation**

*The site attenuation for radiated measurements has been determined for this test site using the method described in ANSI C63.4 Paragraph 5.4.6 and sub paragraphs. The site attenuation is measured annually. Site attenuation was last measured and reported to the FCC 12/15/06.*

#### **3.4 Ground Plane (Ground Screen)**

*The site has a 3900 square foot (20m x 18m) floor area of poured reinforced concrete, 6 to 8 inches thick. A 20m x 18m (66ft x 59ft) solid 24 gauge galvanized sheet steel ground plane is centered on the test area with its long dimension along the major axis of the test site. The antenna mast and turntable are located 3 meters apart on the centerline of the major axis so that each is greater than 3 meters from the edges of the*



**FIGURE 1. TEST SITE LAYOUT.**

*ground plane. The ground plane is connected to a nine-foot long earth ground rod at each corner of the ground plane.*



### **3.5 Input Power for EUT**

*Electricity for the EUT is provided through buried power lines in metallic conduit with an outlet box placed near the EUT. Power for the EUT is taken from the outlet box of either of two “shielded enclosure” quality power line filters located on the ground plane near the EUT. The filters are electrically bonded to the ground plane.*

### **3.6 Accessory Equipment Precautions**

*Care was taken that accessory equipment or adjacent equipment did not produce unacceptable interference so as to contaminate the final test data. The EMI receiver and its associated computer, printer and plotter were located greater than 15 meters away from the EUT during testing and were powered from a separately filtered power source.*

### **3.7 Ambient Interference**

*Ambient interference from radio and television stations, vehicles, mobile radio, etc. was present at the open test site during testing. Care was taken to assure that ambient interference did not overload the measurement receiver or mask emissions from the EUT. The method of measurement used to deal with ambient noise during radiated emission testing is described in Paragraph 5.2.1.*

### **3.8 Personnel**

*All testing was performed by EMCE Engineering personnel who are properly trained for the instruments and procedures used. The test data sheets have been signed-off by the attending EMCE Test Engineer.*

### ***3.9 Use of Interference Measurement Equipment***

*All of the emission measurements and field strength measurements were performed with a Hewlett-Packard 8566B Spectrum Analyzer System. The Spectrum Analyzer System utilizes the following basic instruments:*

- 1. Fujitsu Lifebook Computer*
- 2. EMITest measurement software*
- 2. HP-85650A Quasi Peak Adapter*

*Test results are recorded on tabular data sheets and show final corrected values compared to the specification limit. Sample calculations show how the antenna factors, cable losses, amplifier gain, etc. are combined in the automatic analyzer program to produce the final corrected values shown on the graphs and data sheets.*

### ***3.10 Calibration of Measuring Equipment***

*The EMI Receiver (spectrum analyzer) is calibrated by an outside calibration laboratory on a 12-month basis. The laboratory provides certification with traceability to NIST. Antenna factors are measured at 1-year interval by EMCE Engineering using the reference antenna method of ANSI C63.5-2003. Cable losses as well as amplifier gains are swept at least every month to verify accurate values.*

## 4.0 PREPARATION OF EUT FOR TEST

### 4.1 Identification of EUT

Equipment under Test: **RFID Card Reader**  
Model Number: **SCR 331DI-DTC**  
Serial Number: **001**

### 4.2 Setup of EUT

Power to EUT: **120 VAC Line Voltage, 12 VDC AC Adapter**  
Grounding of EUT: **USB Cable**  
Special Software: **None**

- Orientation of EUT: Per CFR 47, 15.31 and ANSI 63.4-2003, for all measurements the EUT was evaluated in the X, Y, and Z orthogonal axes.
- Loop Antenna was manipulated to find the worst case emission. Positions include, but not limited to parallel and perpendicular to the EUT, and parallel to the ground

### 4.3 Interfaces & Cabling

The following cables were connected during test:

<i>Interface</i>	<i>Source</i>	<i>Load</i>	<i>Length</i>	<i>Cable</i>	<i>Connector</i>
	<u>Port</u>	<u>Port</u>	<u>Cable</u>	<u>Type</u>	<u>Material</u>
USB	USB Power Supply	EUT	0.5M	Unshielded	Plastic

### 4.4 Peripherals

The following peripherals were attached and operating during the tests:

<u>Nomenclature</u>	<u>Mfgr &amp; Model</u>
Laptop PC	HP dv4000

## **5.0 TEST PROCEDURES**

### **5.1 Conducted Emissions, Power Leads, 150 kHz to 30 MHz**

*Conducted emissions were measured from 150kHz to 30MHz on the power and return leads of the EUT according to the methods defined in ANSI C63.4, Section 7.0 and the limits found in CFR 47, 15.107. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane and removed from the vertical ground plane by 40-cm as shown in Appendix D, Photographs of Test Setup. The interface cables and equipment positioning were varied within limits of reasonable application per Figure 9A of ANSI C63.4 to determine the position producing maximum conducted emissions.*

*The LISN and high pass filter were connected through 20 feet of RG-214 coaxial cable to the spectrum analyzer input. The switch on the LISN was set to the Supply Line position and the power was applied. The EUT was operated as described in Paragraph 4.0 in a mode, which was intended to produce maximum emissions for normal operation.*

*The switch in the LISN was then set to the Return Line position and the interference scan was repeated and an additional set of data sheets and plot charts were prepared for the return lead.*

#### **5.1.1 Test Results**

*PASS (See Appendix B)*

#### **5.1.2 Test Instrumentation**

*See Appendix I – 1,2,3,4,10*

#### **5.1.3 Recommendations**

*Due to the fact that there were no test failures, there are no recommendations.*

## **5.2 Radiated Emissions Test, 30 MHz to 1000 MHz**

*Radiated emissions were measured from 30 MHz to 1000 MHz. The measurement bandwidth was 120 kHz according to the methods defined in ANSI C63.4 Section 8.0. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meters above the ground plane.*

*The EUT was operated as described in Paragraph 4.0, in a mode, which was intended to produce maximum emissions. Preliminary scans of the frequency range were used to determine the cable configurations and equipment positions which produce maximum emissions. These configurations were then kept intact while both angle of rotation of the EUT with respect to the antenna and antenna height were scanned for maximum readings.*

### **5.2.3 Test Results**

*The EUT passed both vertical and horizontal radiated emissions tests.*

### **5.2.4 Test Instrumentation**

*See Appendix I – 1-10*

### **5.2.5 Recommendations**

*Because there were no test failures, there are no recommendations.*

# *APPENDIX A*

## **Certifications**

### **EMCE NVLAP Accreditation**



**National Voluntary  
Laboratory Accreditation Program**



**SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999**

**Universal Compliance Labs dba EMCE Engineering**

44366 South Grimmer Boulevard

Fremont, CA 94538-6385

Mr. Bob Cole

Phone: 510-490-4307 Fax: 510-490-3441

E-Mail: bob@universalcompliance.com

URL: http://www.universalcompliance.com

**ELECTROMAGNETIC COMPATIBILITY  
AND TELECOMMUNICATIONS**

**NVLAP LAB CODE 200092-0**

*NVLAP Code Designation / Description*

**Emissions Test Methods:**

- |            |  |
|------------|--|
| 12/CIS22   | IEC/CISPR 22 (1997) & EN 55022 (1998) + A1(2000): Limits and methods of measurement of radio disturbance characteristics of information technology equipment                                   |
| 12/CIS22a  | IEC/CISPR 22 (1993) and EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996) |
| 12/CIS22b  | CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment  |
| 12/FCC15b1 | ANSI C63.4 (2003) with FCC Method 47 CFR Part 15, Subpart B: Unintentional Radiators   |
| 12/T51a    | AS/NZS CISPR 22 (2004): Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement   |

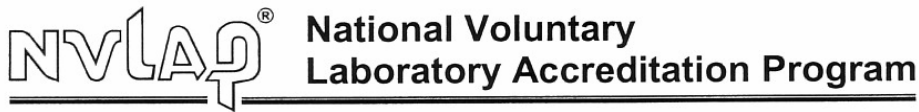
**Immunity Test Methods:**

- |        |   |
|--------|---|
| 12/I01 | IEC 61000-4-2, Ed. 1.2 (2001) + A1, A2; EN 61000-4-2: Electrostatic Discharge Immunity Test   |
| 12/I03 | IEC 61000-4-4(1995), A1(2000), A2(2001); EN 61000-4-4: Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical Fast Transient/Burst Immunity Test |

2007-01-01 through 2007-12-31

*Effective dates*

*For the National Institute of Standards and Technology*



**ELECTROMAGNETIC COMPATIBILITY  
AND TELECOMMUNICATIONS**

**NVLAP LAB CODE 200092-0**

<i>NVLAP Code</i>	<i>Designation / Description</i>
12/I04	IEC 61000-4-5, Ed. 1.1 (2001-04); EN 61000-4-5: Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
12/I05	IEC 61000-4-6, Ed. 2.0 (2003-05); EN 61000-4-6: Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
12/I06	IEC 61000-4-8, Ed. 1.1 (2001); EN 61000-4-8: Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
12/I07	IEC 61000-4-11, Ed. 1.1 (2001-03); EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

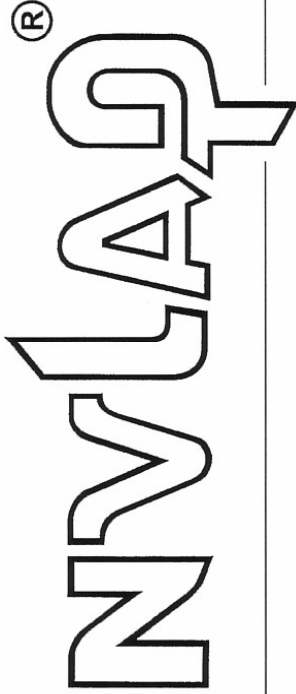
2007-01-01 through 2007-12-31

*Effective dates*

*Dally S. Bruce*  
For the National Institute of Standards and Technology



United States Department of Commerce  
National Institute of Standards and Technology



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## Certificate of Accreditation to ISO/IEC 17025:1999

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NVLAP LAB CODE: 200092-0

**Universal Compliance Labs dba EMCE Engineering**  
Fremont, CA

is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in  
NIST Handbook 150:2001 and all requirements of ISO/IEC 17025:1999.  
Accreditation is granted for specific services, listed on the Scope of Accreditation, for:

**ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS**



2007-01-01 through 2007-12-31  
Effective dates

*Dolly S. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2005-05-19)

# ***APPENDIX B***

## ***Test Data Sheets***

***Conducted Emissions***  
***Radiated Emissions***

## ***LINE CONDUCTED EMISSIONS TEST***

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **SCM Micro**  
 Specification: **EN55022 B COND [AVE]**  
 Work Order #: **2751** Date: 11/28/2007  
 Test Type: **Conducted Emissions** Time: 12:57:54 PM  
 Equipment: **Smart Card Reader** Sequence#: 10  
 Manufacturer: **SCM Micro** Tested By: **Bob Cole**  
 Model: **SCR331** 120V 60Hz  
 S/N:

***Test Equipment:***

Function	S/N	Calibration Date	Cal Due Date	Asset #
----------	-----	------------------	--------------	---------

***Equipment Under Test (\* = EUT):***

Function	Manufacturer	Model #	S/N
Smart Card Reader*	SCM Micro	SCR331	

***Support Devices:***

Function	Manufacturer	Model #	S/N
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***Test Conditions / Notes:***

PS2
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***Transducer Legend:***

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Ext Attn: 0 dB

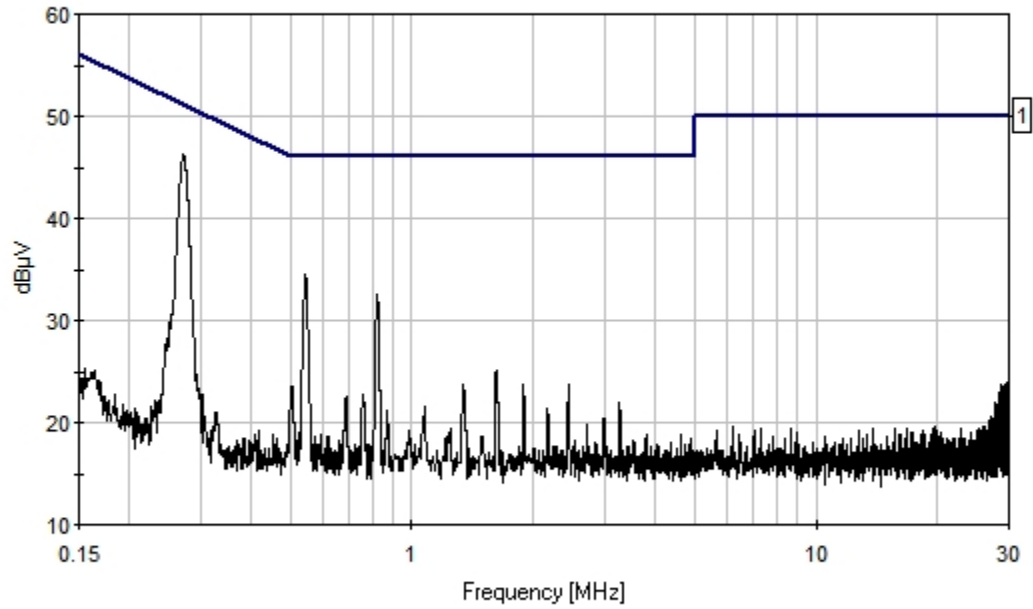
***Measurement Data:***

Reading listed by margin.

Test Lead: Line 1

#	Freq MHz	Rdng dBµV					Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	271.442k	46.2					+0.0	46.2	51.1	-4.9	Line
2	546.324k	34.6					+0.0	34.6	46.0	-11.4	Line
3	820.478k	32.6					+0.0	32.6	46.0	-13.4	Line
4	1.626M	25.1					+0.0	25.1	46.0	-20.9	Line
5	1.345M	23.8					+0.0	23.8	46.0	-22.2	Line
6	1.889M	23.8					+0.0	23.8	46.0	-22.2	Line
7	2.434M	23.7					+0.0	23.7	46.0	-22.3	Line
8	29.728M	23.9					+0.0	23.9	50.0	-26.1	Line
9	28.821M	23.8					+0.0	23.8	50.0	-26.2	Line
10	29.268M	23.7					+0.0	23.7	50.0	-26.3	Line

EMCE Engineering Date: 11/28/2007 Time: 12:57:54 PM SCM Micro WO#: 2751  
EN55022 B COND [AVE] Test Lead: Line 1 120V 60Hz Sequence#: 10



— Sweep Data      — 1 - EN55022 B COND [AVE]

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **SCM Micro**  
 Specification: **EN55022 B COND [AVE]**  
 Work Order #: **2751**  
 Test Type: **Conducted Emissions**  
 Equipment: **Smart Card Reader**  
 Manufacturer: **SCM Micro**  
 Model: **SCR331**  
 S/N:

Date: 11/28/2007  
 Time: 12:50:29 PM  
 Sequence#: 8  
 Tested By: Bob Cole  
 120V 60Hz

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
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**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Smart Card Reader*	SCM Micro	SCR331	

**Support Devices:**

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

**Test Conditions / Notes:**

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**Transducer Legend:**

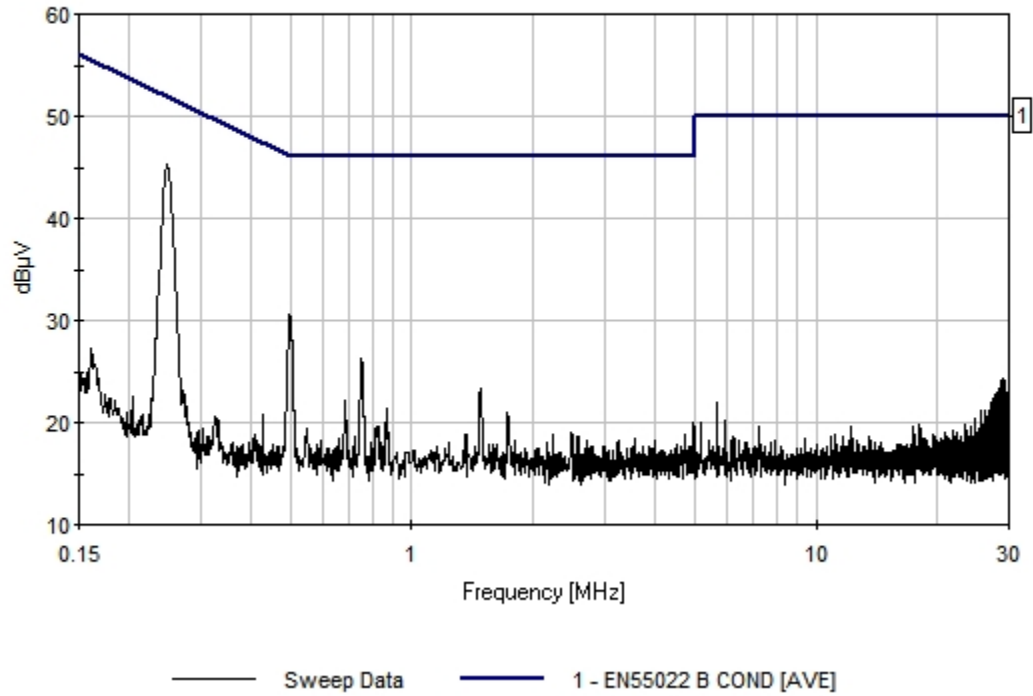
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Ext Attn: 0 dB

**Measurement Data:** Reading listed by margin. Test Lead: Line 2

#	Freq MHz	Rdng dBµV	dB				Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	248.172k	45.2					+0.0	45.2	51.8	-6.6	Line
2	501.238k	30.4					+0.0	30.4	46.0	-15.6	Line
3	748.486k	26.2					+0.0	26.2	46.0	-19.8	Line
4	29.011M	24.3					+0.0	24.3	50.0	-25.7	Line
5	28.788M	24.1					+0.0	24.1	50.0	-25.9	Line
6	29.239M	24.1					+0.0	24.1	50.0	-25.9	Line
7	28.555M	24.0					+0.0	24.0	50.0	-26.0	Line
8	28.671M	24.0					+0.0	24.0	50.0	-26.0	Line
9	29.467M	24.0					+0.0	24.0	50.0	-26.0	Line
10	29.922M	23.6					+0.0	23.6	50.0	-26.4	Line

EMCE Engineering Date: 11/28/2007 Time: 12:50:29 PM SCM Micro WO#: 2751  
EN55022 B COND [AVE] Test Lead: Line 2 120V 60Hz Sequence#: 8



## UNINTENTIONAL RADIATED EMISSIONS TEST

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **SCM Micro**  
 Specification: **EN55022B RADIATED**  
 Work Order #: **2751** Date: 10/31/2007  
 Test Type: **Radiated Scan** Time: 12:03:56  
 Equipment: **Smart Card Reader** Sequence#: 2  
 Manufacturer: **SCM Micro** Tested By: **Bob Cole**  
 Model: **SCR331**  
 S/N:

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
----------	-----	------------------	--------------	---------

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Smart Card Reader*	SCM Micro	SCR331	

**Support Devices:**

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

**Test Conditions / Notes:**

--

**Transducer Legend:**

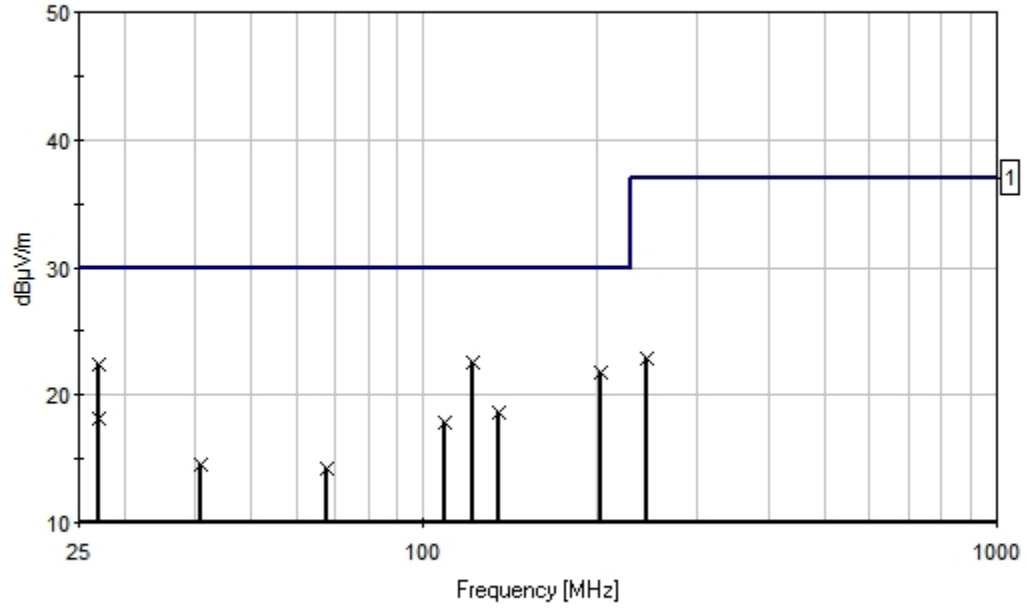
T1=AH SAS-200/543 S/N: 199	T2=EMCE Y1 Cable - Radiated Site
T3=8447 Pre-Amp	

Ext Attn: 0 dB

**Measurement Data:** Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	Reading listed by margin.			dB	Test Distance: 10 Meters				
			T1 dB	T2 dB	T3 dB		Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	122.043M	35.9	+11.3	+2.0	+26.6	+0.0	22.6	30.0	-7.4	Vert	
2	27.123M	37.1	+12.4	+0.0	+27.1	+0.0	22.4	30.0	-7.6	Vert	
3	203.399M	31.3	+14.5	+2.6	+26.7	+0.0	21.7	30.0	-8.3	Vert	
4	135.603M	31.1	+12.0	+2.2	+26.6	+0.0	18.7	30.0	-11.3	Vert	
5	27.117M	32.8	+12.4	+0.0	+27.1	+0.0	18.1	30.0	-11.9	Horiz	
6	108.483M	32.7	+10.0	+1.9	+26.7	+0.0	17.9	30.0	-12.1	Vert	
7	244.081M	31.4	+15.3	+2.8	+26.7	+0.0	22.8	37.0	-14.2	Vert	
8	40.681M	28.4	+11.9	+1.2	+26.9	+0.0	14.6	30.0	-15.4	Horiz	
9	67.793M	32.2	+7.4	+1.5	+26.9	+0.0	14.2	30.0	-15.8	Horiz	

EMCE Engineering Date: 10/31/2007 Time: 12:03:56 SCM Micro WO#: 2751  
EN55022B RADIATED Test Distance: 10 Meters Sequence#: 2



— Readings    — 1 - EN55022B RADIATED    × Peak Readings



**APPENDIX C**  
**Test Data Sheets**  
**Intentional Radiator Results**

## INTENTIONAL RADIATOR

Maximum allowed field strength in the frequency range of 13.553-13.567 MHz is 15,848 microvolts per meter, or 84 dBuV/M at a test distance of 30 meters. Test distance for this measurement is 1 meter. The calculation for determining the field strength limit at 1 meter is as follows:

$$\begin{aligned}\text{Correction Factor} &= 40 \log (\text{distance } 1 / \text{distance } 2) \\ \text{Correction Factor} &= 40 \log (30/1) \\ \text{Correction Factor} &= 59.1 \text{ dBuV/M}\end{aligned}$$

Therefore, the limit used for this measurement is 143.1 dBuV/M

**The plot on the following page shows the peak power output of the EUT as being 74.0 dBuV/M. at 13.56 MHz**, which is the fundamental transmit frequency for this device.

Test results show compliance to the limits called out in CFR 47, Section 15.225 (a), (b), (c), (d) and (e), as well as RSS-210 6.2.2(e) as follows:

**TEST RESULTS**  
**Peak Output Power**

Per CFR 47, Section 15.225 and RSS-210 Issue 5, Section 6.2.2(e)

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **SCM Micro**  
 Specification: **RFID Band 13.110-14.010 MHz**  
 Work Order #: **2745** Date: 10/31/2007  
 Test Type: **Radiated Scan** Time: 12:49:52 PM  
 Equipment: Sequence#: 3  
 Manufacturer: Tested By: Bob Cole  
 Model:  
 S/N:

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
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**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
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**Support Devices:**

Function	Manufacturer	Model #	S/N
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**Test Conditions / Notes:**

Config #1
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**Transducer Legend:**

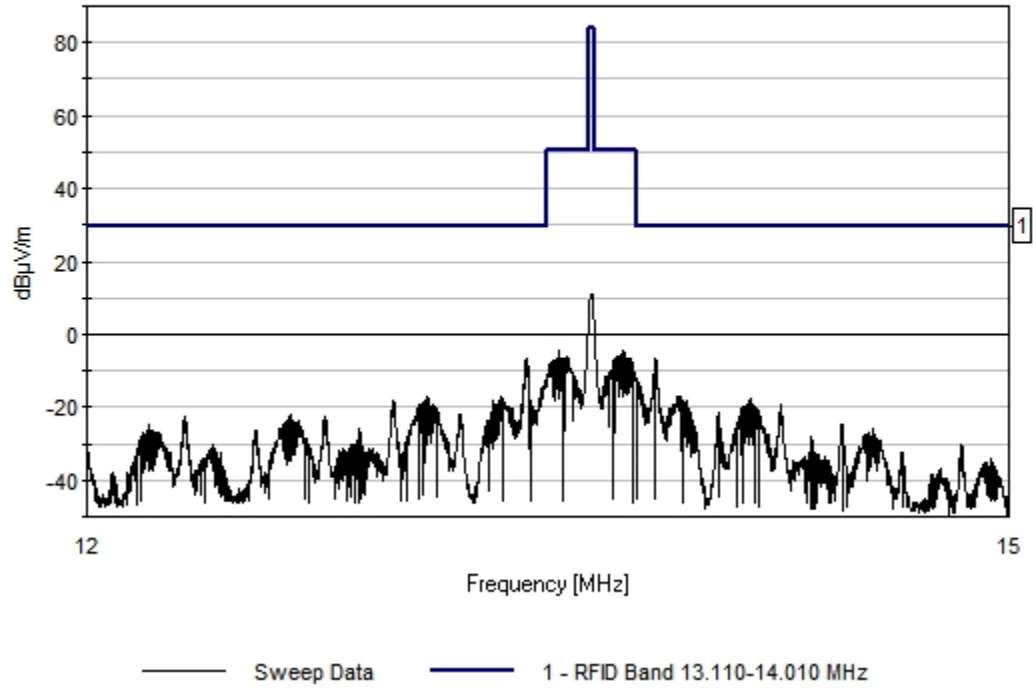
T1=cable5 test	T2=8447 Pre-Amp
T3=LP-105 Loop Antenna	

Ext Attn: 0 dB

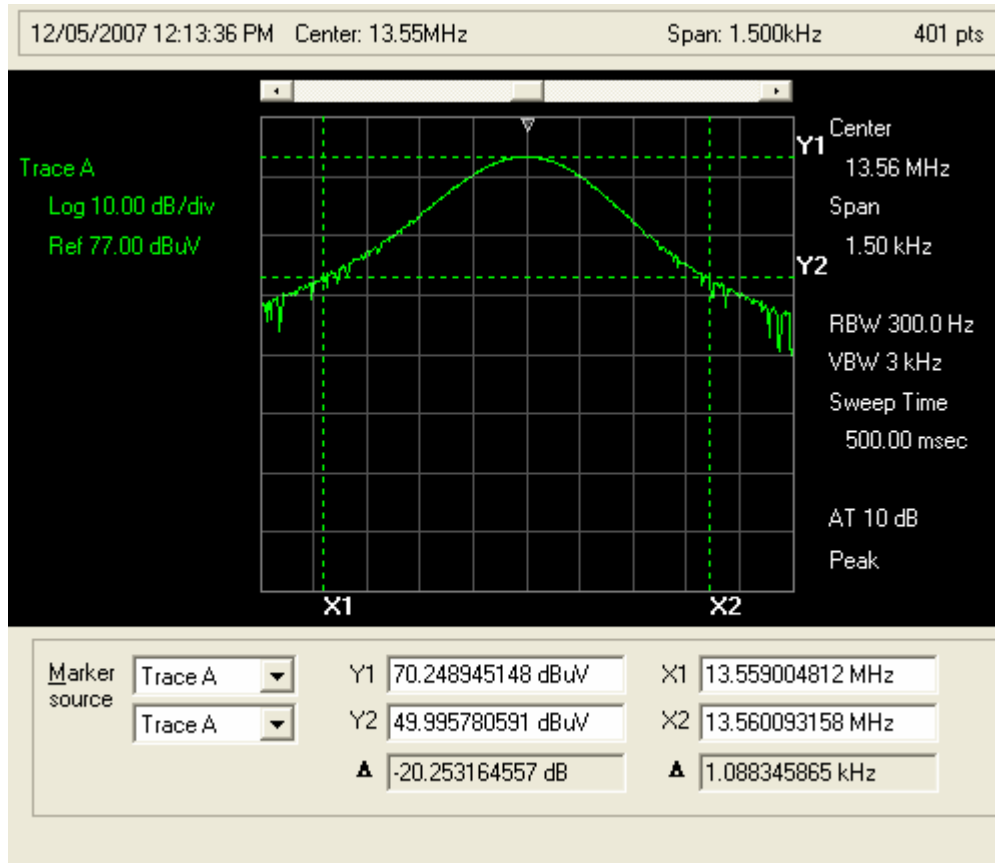
**Measurement Data:** Reading listed by amplitude. Test Distance: 1 Meter

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	Dist Table dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	13.559M	74.0	+0.2	+27.2	+19.7	-59.0	7.7	50.5	-42.8	Vert
2	13.768M	60.1	+0.2	+27.2	+19.5	-59.0	-6.4	29.5	-35.9	Vert
3	13.772M	59.5	+0.2	+27.2	+19.5	-59.0	-7.0	29.5	-36.5	Vert
4	13.348M	59.3	+0.2	+27.2	+19.8	-59.0	-6.9	29.5	-36.4	Vert
5	13.765M	58.3	+0.2	+27.2	+19.5	-59.0	-8.2	29.5	-37.7	Vert
6	13.711M	54.0	+0.2	+27.2	+19.6	-59.0	-12.4	29.5	-41.9	Vert
7	13.409M	53.6	+0.2	+27.2	+19.7	-59.0	-12.7	29.5	-42.2	Vert
8	13.717M	52.4	+0.2	+27.2	+19.6	-59.0	-14.0	29.5	-43.5	Vert
9	13.723M	52.1	+0.2	+27.2	+19.5	-59.0	-14.4	29.5	-43.9	Vert
10	13.394M	51.4	+0.2	+27.2	+19.8	-59.0	-14.8	29.5	-44.3	Vert

EMCE Engineering Date: 10/31/2007 Time: 12:49:52 PM SCM Micro WO#: 2745  
RFID Band 13.110-14.010 MHz Test Distance: 1 Meter Sequence#: 3



**20 dB Bandwidth**  
**Per RSS-210, Section 5.9.1**  
**20 dB BW = 1.088 kHz**



### Frequency Stability

*CFR 47, Section 15.225(e) and Sec 15.31(e), RSS-210 Sec 6.2.2(e) and 6.4*

<u>Temperature (Celcius)</u>	<u>Voltage (DC)</u>	<u>Transmit Frequency (MHz)</u>	<u>Upper Limit (MHz)</u>	<u>Lower Limit (MHz)</u>	<u>Pass / Fail</u>
Ambient	102.00	13.560	13.561356	13.558644	PASS
Ambient	120.00	13.559	13.561356	13.558644	PASS
Ambient	138.00	13.560	13.561356	13.558644	PASS
+50	120.00	13.559	13.561356	13.558644	PASS
-20	120.00	13..559	13.561356	13.558644	PASS

## Field Strength of Harmonics

*CFR 47, Section 15.225(d), RSS-210 Sec 6.3*

*Limits from CFR 47, Section 15.209*

*Test Distance: 3 meters*

Frequency (MHz)	Measurement Field strength (microvolts/meter)	distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer:	<b>SCM Micro</b>	Date:	10/31/2007
Specification:	<b>EN55022B RADIATED</b>	Time:	12:03:56
Work Order #:	<b>2751</b>	Sequence#:	2
Test Type:	<b>Radiated Scan</b>	Tested By:	Bob Cole
Equipment:	<b>Smart Card Reader</b>		
Manufacturer:	SCM Micro		
Model:	SCR331		
S/N:			

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Smart Card Reader*	SCM Micro	SCR331	

**Support Devices:**

Function	Manufacturer	Model #	S/N

**Test Conditions / Notes:**

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**Transducer Legend:**

T1=AH SAS-200/543 S/N: 199	T2=EMCE Y1 Cable - Radiated Site
T3=8447 Pre-Amp	

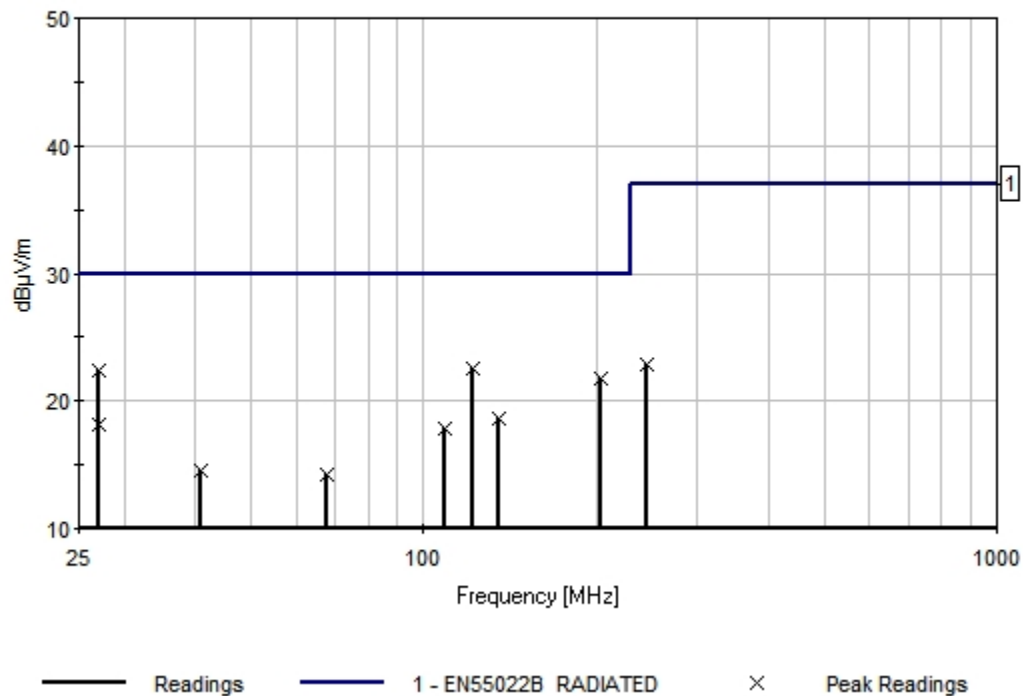
Ext Attn: 0 dB

**Measurement Data:**      Reading listed by margin.      Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	Dist dB	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	122.043M	35.9	+11.3	+2.0	+26.6	+0.0	22.6	30.0	-7.4	Vert

2	27.123M	37.1	+12.4	+0.0	+27.1	+0.0	22.4	30.0	-7.6	Vert
3	203.399M	31.3	+14.5	+2.6	+26.7	+0.0	21.7	30.0	-8.3	Vert
4	135.603M	31.1	+12.0	+2.2	+26.6	+0.0	18.7	30.0	-11.3	Vert
5	27.117M	32.8	+12.4	+0.0	+27.1	+0.0	18.1	30.0	-11.9	Horiz
6	108.483M	32.7	+10.0	+1.9	+26.7	+0.0	17.9	30.0	-12.1	Vert
7	244.081M	31.4	+15.3	+2.8	+26.7	+0.0	22.8	37.0	-14.2	Vert
8	40.681M	28.4	+11.9	+1.2	+26.9	+0.0	14.6	30.0	-15.4	Horiz
9	67.793M	32.2	+7.4	+1.5	+26.9	+0.0	14.2	30.0	-15.8	Horiz

EMCE Engineering Date: 10/31/2007 Time: 12:03:56 SCM Micro WO#: 2751  
 EN55022B RADIATED Test Distance: 10 Meters Sequence#: 2





# ***APPENDIX D***

*EUT MODIFACTION LIST AND PHOTOS*

*N/A - NO modifications necessary*

# ***APPENDIX E***

## ***TEST EQUIPMENT LIST***

## *Test Equipment List*

Name	Manufacturer	Model	Cal. Due Date	Designator
<i>Spectrum Analyzer</i>	<i>Hewlett-Packard</i>	<i>8568B</i>	<i>2/1/08</i>	<i>1</i>
<i>Quasi-Peak Adapter</i>	<i>Hewlett-Packard</i>	<i>85650A</i>	<i>2/1/08</i>	<i>2</i>
<i>LISN</i>	<i>EMCO</i>	<i>3816/2</i>	<i>11/15/08</i>	<i>3</i>
<i>Antenna Mast</i>	<i>EMCO</i>	<i>1050</i>	<i>N/A</i>	<i>4</i>
<i>Rotating Table</i>	<i>EMCO</i>	<i>1060</i>	<i>N/A</i>	<i>5</i>
<i>Antenna, Biconical</i>	<i>Electro-Metrics</i>	<i>BIA-30</i>	<i>6/17/08</i>	<i>6</i>
<i>Antenna, Log-periodic</i>	<i>Electro-Metrics</i>	<i>LPA-30</i>	<i>6/17/08</i>	<i>7</i>
<i>Antenna, Loop</i>	<i>Empire Devices</i>	<i>LP-105</i>	<i>6/20/08</i>	<i>8</i>
<i>Preamplifier</i>	<i>Hewlett-Packard</i>	<i>8447D</i>	<i>11/15/08</i>	<i>9</i>
<i>Computer Controller</i>	<i>Fujitsu / EMITest</i>	<i>Lifebook</i>	<i>N/A</i>	<i>10</i>