EMC EMISSIONS - TEST REPORT (Full)

Test Report No.	**BC300470-1**	Issue Date:	**3-Jan-2005**
Model / Serial No.	**3000 / 1**		
Product Type	**RFID Reader**		
Client	**Right Tag**		
Manufacturer	**Right Tag**		
License holder	**Right Tag**		
Address	**2048 Lovell Place**		
	Santa Clara, CA 95051		
Test Criteria Applied	**FCC CFR47 Part 15.225**		
Test Result	**PASS**		Title 47 CFR 15.225: RADIO FREQUENCY DEVICES operating in the frequency range of 13.553-13.567MHz (including 15.205, 15.207, 15.209 where applicable)
Test Project Number	**BC300470-1**		
References			
Total Pages Including Appendices:	36		

Reviewed By :

Approved By :

International Approval Laboratories and its professional staff hold government and professional organization certifications and are members of IEEE, NVLAP, and VCCI.

NVLAP
Lab Code: 200624-0

Accredited

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty for Conducted Emissions in the frequency range of 150kHz – 30MHz is calculated to be ±2.30dB and for Radiated Emissions is calculated to be ±3.60dB in the frequency range of 30MHz – 200MHz and ±3.38dB in the frequency range of 200MHz – 1000MHz.

EUT Received Date: 1-July-2004

Testing Start Date: 1-July-2004

Testing End Date: 30-Dec-2004

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The tests were performed according to following regulations :

1. FCC CFR47 Part 15.205
2. FCC CFR47 Part 15.207
3. FCC CFR47 Part 15.209
4. FCC CFR47 Part 15.231
5. ICES-003

Emission Test Results:

Conducted Emissions, Powerline (15.207) - PASS

Test Result

Minimum limit margin -8.9 dB at 0.212 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: Powered off PS2 Port of the computer / Measured on AC Mains

Radiated Emissions (15.209) / 15.225 (b) - PASS

Test Result

Minimum limit margin -8.9 dB at 49.01 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

In Band Radiated Emissions 15.225(a) - PASS

Test Result

Minimum limit margin -32.6 dB at 13.56 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: Field measurements in the band of 13.553-13.567 may not exceed 15,848uV/m @ 30m

Radiated Emissions 15.255(c) - PASS

Test Result

Remarks: Devices operated within the frequency band of 13.553-13.567MHz: **-20dBc Bandwidth** maximum of 0.01% of the center frequency as measured through the temp range of -20 to +50 deg. C, and at 85 - 115% of the nominal supply voltage at 20 deg. C “a new battery would be used in cases where the device is powered from a battery”

Radiated Emissions RSS-210 - PASS

Test Result

Remarks: **-20dBc Bandwidth** maximum of 0.25% of the center frequency

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GENERAL REMARKS:

The following remarks are to be considered as "where applicable" and are taken into account while completing any FCC/IC/ETSI radio tests at International Approvals Laboratories, LLC.

Testing was performed in 3 different orthogonal axis to determine the worst case emissions from the device. The worst case emissions measurements are shown in this report.

FCC CFR47 Part 15.31: Measurement Standards: In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

FCC CFR47 Part 15.35: Measurement Detector Functions and Bandwidths: FCC Part 15.35 was utilized when performing the measurements within this report.

In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

The actual test distance for the FCC Part 15.209 testing was conducted at 10m for the fact that the device was being tested to EN55022 Class B from 30 MHz to 1000 MHz (meets/exceeds the FCC Part 15.209 & 109B limits) The data is automatically extrapolated back to the FCC 3m limits and measurements are corrected to better show the compliance to FCC requirements and reduce confusion. A correction factor of 10.54dB is used in cases of 30MHz and up for a difference between 10m and 3m measurement distances. All measurements that are lesser than 30MHz where applicable are accompanied with the fall of measurements and calculations to support the interpolation.

Support Equipment Description:
DELL Laptop Computer / Model: Latitude C600 / Serial: TW-0791UH-12800-0CC-4067, HP LJ4+ printer / Model: C2039A / Serial: JPGF016054, Creative Sound Speakers / Model: SB5270 / Serial: SW00403121001376
Support Equipment was used in order to provide power to the EUT and monitor that the EUT was operational. The actual application of the EUT is to be connected to a POS terminal in a department store.

Modifications required to pass: **NONE**

Test Specification Deviations: **NONE**

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Required Information In Accordance to FCC CFR 47 Part 2.1033:

Rule Part 11, 15 & 18 Devices	*Other Rule Part Devices*	*Description*	*Comments*
2.1033(b)(1)	**2.1033(c)(1)**	*Manu. Contact*	See Page 1 of this report
2.1033(b)(2)	**2.1033(c)(2)**	*FCC Identifier*	
2.1033(b)(3)	**2.1033(c)(3)**	*Users Manual to include Operating, installation*	Attached as Exhibit
	2.1033(c)(4)	*Emissions Designator per 2.*	
	2.1033(c)(5)	*Frequency Range*	Not Applicable to Part 15 Devcies
	2.1033(c)(6)	*Power range and controls*	Not Applicable to Part 15 Devcies
	2.1033(c)(7)	*Maximum power ouput rating*	Not Applicable to Part 15 Devcies
	2.1033(c)(8)	*DC Voltage and Current suplying final RF stages*	Not Applicable to Part 15 Devcies
2.1033(b)(3)	**2.1033(c)(9)**	*Tune –up procedure*	Please refer to the users manual for applicability
2.1033(b)(4&5)	**2.1033(c)(10)**	*Complete Circuit Diagrams and circuit operation description*	Attached as Exhibit
2.1033(b)(7)	**2.1033(c)(11)**	*Photographs/drawings of the identification label & its location on the device*	Attached as Exhibit
2.1033(b)(7)	**2.1033(c)(12)**	*Photographs of the external and internal surfaces, and construction*	Attached as Exhibit
	2.1033(c)(13)	*Digital Modulation*	Not Applicable
2.1033(b)(6)	**2.1033(c)(14)**	*Report of Measurement Data Required by 2.1046 – 2.1057*	See Data Below (This report consists of the testing required under Part 15.231)
2.1033(b)(8)		*Description of publicly available support equipment used during test*	Refer to Exhibit B of this report (Client Test Plan)
2.1033(b)(9)		*Statement of Autorization to Part 15.37 of CFR47*	The equipment herein is being authorized in accordance to 15.37 of the CFR47 Rules.
2.1033(b)(10)		*Direct Sequence Spread Spectrum Devices (DSSS)*	Exhibit of compliance to 15.247(e)
2.1033(b)(10)		*Frequency Hopping Devices*	Exhibit of compliance to 15.247(a)(1)
2.1033(b)(11)		*Scanning receiver construction*	Exhibit stating compliance to construction in accordance to 15.121.
15.31	**15.31**	*Transmitter Supply Voltage*	Testing herein was completed in accordance to FCC CFR47 Part 15.31

Exhibits Including (where applicable):

1. Users Manual
2. Operation Description
3. Block Diagram
4. Report of Measurement
5. External & Internal Photographs
6. Schematic
7. Parts List
8. Tuning Procedure (if applicable)
9. Test Setup Photograph
10. Label Drawings and or Photograpghs
11. Description of Support Equipment (where Applicable)

Required Information in Accordance to Industry Canada Regulations (In addition to the above):

Information Required	*Description*	*Comments*
Modulation Type	(i.e. ASK, NON, FSK, DSSS, FHSS, etc.)	
Emissions Designator	Per TRC-49	
In Country Representative	Contact Information	
99% Bandwidth Measurement	Per RSS-210	

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Test-setup photo(s):
Unintentional Radiated Emissions

Missing photo
Setup was consistent with ANSI 63.4 for a Class B Device

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Test-setup photo(s):
Unintentional Conducted Emissions

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Test-setup photo(s):
Unintentional Conducted Emissions

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Test-setup photo(s):
Intentional Radiated Emissions

The date on the photo shown 3-25-04
The unit was retested on July 1st 2004 after a PCB change was made

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Test-setup photo(s):
Radiated Emissions

The date on the photo shown 3-25-04
The unit was retested on July 1st 2004 after a PCB change was made

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Appendix A

Test Data Sheets

and

Test Equipment Used

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Part 15.225 (a)

Field Strength Emissions from Intentional Radiators
Operating in the 13.553-13.567MHz Band

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Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #:	**BC300470**	Test Area:	Pinewood Site 1 (30m)	Temperature:	22	°C
Test Method:	FCC CFR47 Part 15.225/209	Test Date:	01-July-2004	Relative Humidity:	48	%
EUT Model #:	3000	EUT Power:	5VDC	Air Pressure:	80	kPa
EUT Serial #:	1			Page:		
Manufacturer:	Right Tag					
EUT Description:	RFID Reader					
Notes:						

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FCC CFR47 Part 15.225 (a) @ 30m (EA1)

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Final Corrected	Limit	DELTA	AXIS
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dBuV/m)	(dBuV/m) 15.225(a)	(dB)	
Fundamental Worst Case								
13.56	20.9 Qp	0.7 / 10.6 / 0.0	32.2	V / 1.0 / 0.0	32.2	84	51.8	X
13.56	36.1 Qp	0.7 / 10.6 / 0.0	47.4	H / 4.0 / 281.0	47.4	84	36.6	X
Fundamental measurements were worst case with the Rx antenna parallel to the device under test (positioning).								

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Part 15.225 (b) / 15.209

Spurious emissions outside of the 15.225 band

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Field Strength Measurements
Spurious of the Transmitter

Test Report #:	**BC300470**	Test Area:	Pinewood Site 1 (30m)	Temperature:	22	°C
Test Method:	FCC CFR47 Part 15.225/209	Test Date:	01-July-2004	Relative Humidity:	48	%
EUT Model #:	3000	EUT Power:	5VDC	Air Pressure:	80	kPa
EUT Serial #:	1			Page:		
Manufacturer:	Right Tag					
EUT Description:	RFID Reader					
Notes:						

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <30MHz	N/A
No Emissions Observed from 9kHz to 30MHz other than that of the fundamental frequency.						
No emissions found at 27.12MHz						
Noise floor.						
27.12	6.0 Qp	1.4 / 8.9 / 0.0	16.3	H / 1.0 / 0.0	13.24	N/A
27.12	6.0 Qp	1.4 / 8.9 / 0.0	16.3	V / 1.0 / 0.0	13.24	N/A

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Field Strength Measurements
Spurious of the Transmitter

Test Report #:	**BC300470**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22	°C
Test Method:	FCC CFR47 Part 15.225/209	Test Date:	01-July-2004	Relative Humidity:	48	%
EUT Model #:	3000	EUT Power:	5VDC	Air Pressure:	80	kPa
EUT Serial #:	1			Page:		
Manufacturer:	Right Tag					
EUT Description:	RFID Reader					
Notes:						

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV/m)	(m) (DEG)	FCC Part 15.209	< 1 GHzN/A
Bicon Antenna Vertical						
0 degrees						
48.01	40.7 Qp	0.8 / 11.1 / 28.4	24.2	V / 1.0 / 0.0	-15.8	N/A
122.06	30.5 Qp	1.1 / 12.2 / 28.1	15.7	V / 1.0 / 0.0	-27.8	N/A
135.63	31.6 Qp	1.2 / 12.7 / 28.0	17.5	V / 1.0 / 0.0	-26.0	N/A
149.20	27.5 Qp	1.2 / 12.6 / 27.9	13.4	V / 1.0 / 0.0	-30.1	N/A
176.31	28.5 Qp	1.3 / 12.9 / 27.8	15.0	V / 1.0 / 0.0	-28.5	N/A
189.84	28.9 Qp	1.4 / 13.6 / 27.7	16.3	V / 1.0 / 0.0	-27.2	N/A
90 degrees						
48.01	45.2 Qp	0.8 / 11.1 / 28.4	28.7	V / 1.0 / 90.0	-11.3	N/A
49.01	46.3 Qp	0.8 / 10.9 / 28.4	29.6	V / 1.0 / 90.0	-10.4	N/A
54.26	37.9 Qp	0.8 / 10.0 / 28.4	20.3	V / 1.0 / 90.0	-19.7	N/A
67.83	39.6 Qp	0.9 / 9.2 / 28.3	21.4	V / 1.0 / 90.0	-18.6	N/A
180 degree						
48.01	46.9 Qp	0.8 / 11.1 / 28.4	30.4	V / 1.0 / 180.0	-9.6	N/A
49.01	47.8 Qp	0.8 / 10.9 / 28.4	31.1	V / 1.0 / 180.0	-8.9	N/A
54.26	37.1 Qp	0.8 / 10.0 / 28.4	19.6	V / 1.0 / 180.0	-20.4	N/A
67.83	36.5 Qp	0.9 / 9.2 / 28.3	18.3	V / 1.0 / 180.0	-21.7	N/A
135.63	28.9 Qp	1.2 / 12.7 / 28.0	14.8	V / 1.0 / 180.0	-28.7	N/A
270 degrees						
48.01	45.6 Qp	0.8 / 11.1 / 28.4	29.1	V / 1.0 / 270.0	-10.9	N/A
49.01	46.4 Qp	0.8 / 10.9 / 28.4	29.7	V / 1.0 / 270.0	-10.3	N/A
Maximized emissions vertical from 30 to 200Mhz						
49.01	47.4 Qp	0.8 / 10.9 / 28.4	30.7	V / 1.0 / 166.0	-9.3	N/A

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Field Strength Measurements
Spurious of the Transmitter

Test Report #:	**BC300470**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22	°C
Test Method:	FCC CFR47 Part 15.225/209	Test Date:	01-July-2004	Relative Humidity:	48	%
EUT Model #:	3000	EUT Power:	5VDC	Air Pressure:	80	kPa
EUT Serial #:	1			Page:		
Manufacturer:	Right Tag					
EUT Description:	RFID Reader					
Notes:						

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC Part 15.209	DELTA2 (dB) < 1 GHzN/A
0 degrees						
67.75	46.1 Qp	0.9 / 9.2 / 28.3	27.9	H / 2.0 / 0.0	-12.1	N/A
122.06	36.0 Qp	1.1 / 12.2 / 28.1	21.2	H / 2.0 / 0.0	-22.3	N/A
135.59	36.1 Qp	1.2 / 12.7 / 28.0	22.0	H / 2.0 / 0.0	-21.5	N/A
90 degrees						
67.78	45.9 Qp	0.9 / 9.2 / 28.3	27.6	H / 2.0 / 90.0	-12.4	N/A
189.84	35.2 Qp	1.4 / 13.6 / 27.7	22.6	H / 2.0 / 90.0	-20.9	N/A
180 degrees						
67.79	41.4 Qp	0.9 / 9.2 / 28.3	23.2	H / 2.0 / 180.0	-16.8	N/A
122.06	35.2 Qp	1.1 / 12.2 / 28.1	20.4	H / 2.0 / 180.0	-23.1	N/A
135.59	34.0 Qp	1.2 / 12.7 / 28.0	19.9	H / 2.0 / 180.0	-23.6	N/A
270 degrees						
67.78	39.5 Qp	0.9 / 9.2 / 28.3	21.2	H / 2.0 / 270.0	-18.8	N/A
122.06	39.3 Qp	1.1 / 12.2 / 28.1	24.5	H / 2.0 / 270.0	-19.0	N/A
135.59	39.1 Qp	1.2 / 12.7 / 28.0	25.0	H / 2.0 / 270.0	-18.5	N/A
Maximized emissions horizonal from 30 to 200MHz						
67.75	47.6 Qp	0.9 / 9.2 / 28.3	29.3	H / 2.3 / 65.3	-10.7	N/A
Log Periodic Horizontal Antenna						
0 degrees						
203.43	31.1 Qp	1.5 / 11.3 / 27.6	16.3	H / 2.3 / 0.0	-27.2	N/A
217.00	31.1 Qp	1.5 / 10.9 / 27.5	16.0	H / 2.3 / 0.0	-30.0	N/A
244.11	31.9 Qp	1.7 / 11.4 / 27.3	17.7	H / 2.3 / 0.0	-28.3	N/A
257.67	35.7 Qp	1.7 / 12.3 / 27.3	22.5	H / 2.3 / 0.0	-23.5	N/A
271.24	30.9 Qp	1.8 / 12.7 / 27.2	18.2	H / 2.3 / 0.0	-27.8	N/A

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Field Strength Measurements
Spurious of the Transmitter

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EUT Description:	RFID Reader					
Notes:						

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC Part 15.209	DELTA2 (dB) < 1 GHzN/A
Horizontal Polarization						
284.79	32.1 Qp	1.9 / 13.3 / 27.2	20.1	H / 2.3 / 0.0	-25.9	N/A
90 degrees						
203.43	36.1 Qp	1.5 / 11.3 / 27.6	21.3	H / 2.3 / 90.0	-22.2	N/A
240.01	29.9 Pk	1.7 / 11.2 / 27.4	15.4	H / 2.3 / 90.0	-30.6	N/A
244.11	32.3 Pk	1.7 / 11.4 / 27.3	18.0	H / 2.3 / 90.0	-28.0	N/A
311.91	27.3 Qp	2.0 / 15.3 / 27.2	17.4	H / 2.3 / 90.0	-28.6	N/A
180 degrees						
203.43	30.1 Qp	1.5 / 11.3 / 27.6	15.3	H / 2.3 / 180.0	-28.2	N/A
217.00	32.4 Qp	1.5 / 10.9 / 27.5	17.3	H / 2.3 / 180.0	-28.7	N/A
240.01	34.2 Qp	1.7 / 11.2 / 27.4	19.7	H / 2.3 / 180.0	-26.3	N/A
244.09	37.6 Qp	1.7 / 11.4 / 27.3	23.4	H / 2.3 / 180.0	-22.6	N/A
257.65	39.6 Qp	1.7 / 12.3 / 27.3	26.4	H / 2.3 / 180.0	-19.6	N/A
271.20	35.4 Qp	1.8 / 12.7 / 27.2	22.8	H / 2.3 / 180.0	-23.2	N/A
284.77	30.4 Qp	1.9 / 13.3 / 27.2	18.4	H / 2.3 / 180.0	-27.6	N/A
270 degrees						
203.41	32.4 Qp	1.5 / 11.3 / 27.6	17.5	H / 2.3 / 270.0	-26.0	N/A
216.96	32.2 Pk	1.5 / 10.9 / 27.5	17.1	H / 2.3 / 270.0	-28.9	N/A
257.67	27.0 Qp	1.7 / 12.3 / 27.3	13.8	H / 2.3 / 270.0	-32.2	N/A
271.20	30.6 Qp	1.8 / 12.7 / 27.2	17.9	H / 2.3 / 270.0	-28.1	N/A
720.03	30.9 Qp	2.3 / 21.3 / 28.5	26.1	H / 2.3 / 270.0	-19.9	N/A
No signals from 200 to 1000MHz with in 15db of the limit Horizontal						
Changing to vertical						
0 degrees						

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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV/m)	(m) (DEG)	FCC Part 15.209	< 1 GHzN/A
216.97	33.2 Qp	1.5 / 10.9 / 27.5	18.1	V / 2.0 / 0.0	-27.9	N/A
240.01	37.0 Qp	1.7 / 11.2 / 27.4	22.5	V / 2.0 / 0.0	-23.5	N/A
257.68	26.7 Qp	1.7 / 12.3 / 27.3	13.5	V / 2.0 / 0.0	-32.5	N/A
271.20	28.9 Qp	1.8 / 12.7 / 27.2	16.2	V / 2.0 / 0.0	-29.8	N/A
311.89	27.2 Qp	2.0 / 15.3 / 27.2	17.3	V / 2.0 / 0.0	-28.7	N/A
720.04	29.1 Qp	2.3 / 21.3 / 28.5	24.2	V / 2.0 / 0.0	-21.8	N/A
90 degrees						
203.41	30.6 Qp	1.5 / 11.3 / 27.6	15.8	V / 2.0 / 90.0	-27.7	N/A
240.01	28.7 Qp	1.7 / 11.2 / 27.4	14.2	V / 2.0 / 90.0	-31.8	N/A
257.65	32.9 Qp	1.7 / 12.3 / 27.3	19.6	V / 2.0 / 90.0	-26.4	N/A
271.21	31.9 Qp	1.8 / 12.7 / 27.2	19.2	V / 2.0 / 90.0	-26.8	N/A
284.75	29.4 Qp	1.9 / 13.3 / 27.2	17.4	V / 2.0 / 90.0	-28.6	N/A
180 degrees						
203.41	34.1 Qp	1.5 / 11.3 / 27.6	19.2	V / 2.0 / 180.0	-24.3	N/A
216.97	30.4 Qp	1.5 / 10.9 / 27.5	15.3	V / 2.0 / 180.0	-30.7	N/A
240.01	35.9 Qp	1.7 / 11.2 / 27.4	21.4	V / 2.0 / 180.0	-24.6	N/A
244.09	28.1 Qp	1.7 / 11.4 / 27.3	13.8	V / 2.0 / 180.0	-32.2	N/A
257.65	34.1 Qp	1.7 / 12.3 / 27.3	20.9	V / 2.0 / 180.0	-25.1	N/A
271.20	32.1 Qp	1.8 / 12.7 / 27.2	19.4	V / 2.0 / 180.0	-26.6	N/A
284.76	30.8 Qp	1.9 / 13.3 / 27.2	18.8	V / 2.0 / 180.0	-27.2	N/A
298.35	42.1 Qp	1.9 / 13.6 / 27.2	30.4	V / 2.0 / 180.0	-15.6	N/A
720.05	26.5 Qp	2.3 / 21.3 / 28.5	21.7	V / 2.0 / 180.0	-24.3	N/A
960.07	23.9 Qp	2.2 / 23.1 / 27.9	21.3	V / 2.0 / 180.0	-32.7	N/A
270 degrees						
203.42	29.0 Qp	1.5 / 11.3 / 27.6	14.2	V / 2.0 / 270.0	-29.3	N/A
216.97	31.1 Qp	1.5 / 10.9 / 27.5	16.0	V / 2.0 / 270.0	-30.0	N/A
240.03	35.8 Qp	1.7 / 11.2 / 27.4	21.3	V / 2.0 / 270.0	-24.7	N/A
244.09	30.3 Qp	1.7 / 11.4 / 27.3	16.0	V / 2.0 / 270.0	-30.0	N/A

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Field Strength Measurements
Spurious of the Transmitter

Test Report #:	**BC300470**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22	°C
Test Method:	FCC CFR47 Part 15.225/209	Test Date:	01-July-2004	Relative Humidity:	48	%
EUT Model #:	3000	EUT Power:	5VDC	Air Pressure:	80	kPa
EUT Serial #:	1			Page:		
Manufacturer:	Right Tag					
EUT Description:	RFID Reader					
Notes:						

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV/m)	(m) (DEG)	FCC Part 15.209	< 1 GHzN/A
284.79	27.0 Qp	1.9 / 13.3 / 27.2	15.0	V / 2.0 / 270.0	-31.0	N/A
298.35	32.0 Qp	1.9 / 13.6 / 27.2	20.4	V / 2.0 / 270.0	-25.6	N/A
720.03	27.9 Qp	2.3 / 21.3 / 28.5	23.1	V / 2.0 / 270.0	-22.9	N/A
Maximized emissions vertical 200mhz to 1GHz						
298.35	42.2 Qp	1.9 / 13.6 / 27.2	30.6	V / 2.0 / 270.0	-15.4	N/A
End of Run						

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Field Strength Measurements
Spurious of the Transmitter

Test Report #:	**BC300470**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22	°C
Test Method:	FCC CFR47 Part 15.225/209	Test Date:	01-July-2004	Relative Humidity:	48	%
EUT Model #:	3000	EUT Power:	5VDC	Air Pressure:	80	kPa
EUT Serial #:	1			Page:		
Manufacturer:	Right Tag					
EUT Description:	RFID Reader					
Notes:						

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC Part 15.209	DELTA2 (dB) < 1 GHzN/A
********** Measurement Summary **********						
49.01	47.8 Qp	0.8 / 10.9 / 28.4	31.1	V / 1.0 / 180.0	-8.9	N/A
48.01	46.9 Qp	0.8 / 11.1 / 28.4	30.4	V / 1.0 / 180.0	-9.6	N/A
67.75	47.6 Qp	0.9 / 9.2 / 28.3	29.3	H / 2.3 / 65.3	-10.7	N/A
298.35	42.2 Qp	1.9 / 13.6 / 27.2	30.6	V / 2.0 / 270.0	-15.4	N/A
135.59	39.1 Qp	1.2 / 12.7 / 28.0	25.0	H / 2.0 / 270.0	-18.5	N/A
67.83	39.6 Qp	0.9 / 9.2 / 28.3	21.4	V / 1.0 / 90.0	-18.6	N/A
122.06	39.3 Qp	1.1 / 12.2 / 28.1	24.5	H / 2.0 / 270.0	-19.0	N/A
257.65	39.6 Qp	1.7 / 12.3 / 27.3	26.4	H / 2.3 / 180.0	-19.6	N/A
54.26	37.9 Qp	0.8 / 10.0 / 28.4	20.3	V / 1.0 / 90.0	-19.7	N/A
720.03	30.9 Qp	2.3 / 21.3 / 28.5	26.1	H / 2.3 / 270.0	-19.9	N/A
189.84	35.2 Qp	1.4 / 13.6 / 27.7	22.6	H / 2.0 / 90.0	-20.9	N/A
203.43	36.1 Qp	1.5 / 11.3 / 27.6	21.3	H / 2.3 / 90.0	-22.2	N/A
244.09	37.6 Qp	1.7 / 11.4 / 27.3	23.4	H / 2.3 / 180.0	-22.6	N/A
271.20	35.4 Qp	1.8 / 12.7 / 27.2	22.8	H / 2.3 / 180.0	-23.2	N/A
240.01	37.0 Qp	1.7 / 11.2 / 27.4	22.5	V / 2.0 / 0.0	-23.5	N/A
284.79	32.1 Qp	1.9 / 13.3 / 27.2	20.1	H / 2.3 / 0.0	-25.9	N/A
216.97	33.2 Qp	1.5 / 10.9 / 27.5	18.1	V / 2.0 / 0.0	-27.9	N/A
176.31	28.5 Qp	1.3 / 12.9 / 27.8	15.0	V / 1.0 / 0.0	-28.5	N/A
311.91	27.3 Qp	2.0 / 15.3 / 27.2	17.4	H / 2.3 / 90.0	-28.6	N/A
149.20	27.5 Qp	1.2 / 12.6 / 27.9	13.4	V / 1.0 / 0.0	-30.1	N/A
960.07	23.9 Qp	2.2 / 23.1 / 27.9	21.3	V / 2.0 / 180.0	-32.7	N/A

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Part 15.207

Conducted Emissions

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Conducted Electromagnetic Emissions

Test Report #:	**BC300470 Run 01**	Test Area:	Pinewood Site 1 Cond	Temperature:	23.5 °C
Test Method:	FCC Part 15.207	Test Date:	30-Dec-2004	Relative Humidity:	<26 %
EUT Model #:		EUT Power:	120 VAC 60 Hz	Air Pressure:	87 kPa
EUT Serial #:				Page:	1 of 2
Manufacturer:	RightTag				
EUT Description:	RFID				
Notes:					

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 (dB) QP15.207	DELTA2 (dB) AV15.207
Line						
0.150	37.7 Qp	0.1 / 0.0 / -10.0	47.8	Line 1	-18.2	N/A
0.150	31.5 Av	0.1 / 0.0 / -10.0	41.6	Line 1	N/A	-14.4
0.218	43.5 Qp	0.1 / 0.0 / -10.0	53.6	Line 1	-9.3	N/A
0.218	29.7 Av	0.1 / 0.0 / -10.0	39.8	Line 1	N/A	-13.1
1.68	22.4 Qp	0.3 / 0.0 / -10.0	32.7	Line 1	-23.3	N/A
1.68	20.6 Av	0.3 / 0.0 / -10.0	30.9	Line 1	N/A	-15.1
13.47	21.9 Qp	0.7 / 0.2 / -10.0	32.8	Line 1	-27.2	N/A
13.47	17.5 Av	0.7 / 0.2 / -10.0	28.4	Line 1	N/A	-21.6
24.28	17.4 Qp	1.0 / 0.4 / -10.0	28.8	Line 1	-31.2	N/A
24.28	10.9 Av	1.0 / 0.4 / -10.0	22.3	Line 1	N/A	-27.7
30.00	14.2 Qp	1.2 / 0.5 / -10.0	25.9	Line 1	-34.1	N/A
30.00	6.7 Av	1.2 / 0.5 / -10.0	18.4	Line 1	N/A	-31.6
Neutral						
0.150	35.6 Qp	0.1 / 0.0 / -10.0	45.7	Neutral	-20.3	N/A
0.150	32.4 Av	0.1 / 0.0 / -10.0	42.5	Neutral	N/A	-13.5
0.212	44.4 Qp	0.1 / 0.0 / -10.0	54.5	Neutral	-8.6	N/A
0.212	31.3 Av	0.1 / 0.0 / -10.0	41.4	Neutral	N/A	-11.7
1.68	22.1 Qp	0.3 / 0.0 / -10.0	32.4	Neutral	-23.6	N/A
1.68	20.4 Av	0.3 / 0.0 / -10.0	30.7	Neutral	N/A	-15.3
13.48	21.6 Qp	0.7 / 0.2 / -10.0	32.5	Neutral	-27.5	N/A
13.48	16.5 Av	0.7 / 0.2 / -10.0	27.4	Neutral	N/A	-22.6
24.27	18.0 Qp	1.0 / 0.4 / -10.0	29.4	Neutral	-30.6	N/A
24.27	11.7 Av	1.0 / 0.4 / -10.0	23.1	Neutral	N/A	-26.9
30.00	14.5 Qp	1.2 / 0.5 / -10.0	26.1	Neutral	-33.9	N/A
30.00	6.9 Av	1.2 / 0.5 / -10.0	18.6	Neutral	N/A	-31.4

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Conducted Electromagnetic Emissions

Test Report #:	**BC300470 Run 01**	Test Area:	Pinewood Site 1 Cond	Temperature:	23.5	°C
Test Method:	FCC Part 15.207	Test Date:	30-Dec-2004	Relative Humidity:	<26	%
EUT Model #:		EUT Power:	120 VAC 60 Hz	Air Pressure:	87	kPa
EUT Serial #:				Page:	2 of 2	
Manufacturer:	RightTag					
EUT Description:	RFID					
Notes:						

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		QP15.207	AV15.207
********** **Measurement Summary** **********						
0.212	44.4 Qp	0.1 / 0.0 / -10.0	54.5	Neutral	-8.6	N/A
0.218	43.5 Qp	0.1 / 0.0 / -10.0	53.6	Line 1	-9.3	N/A
0.150	32.4 Av	0.1 / 0.0 / -10.0	42.5	Neutral	N/A	-13.5
1.68	20.6 Av	0.3 / 0.0 / -10.0	30.9	Line 1	N/A	-15.1
1.68	20.4 Av	0.3 / 0.0 / -10.0	30.7	Neutral	N/A	-15.3
13.47	17.5 Av	0.7 / 0.2 / -10.0	28.4	Line 1	N/A	-21.6
13.48	16.5 Av	0.7 / 0.2 / -10.0	27.4	Neutral	N/A	-22.6
1.68	22.1 Qp	0.3 / 0.0 / -10.0	32.4	Neutral	-23.6	N/A
24.27	11.7 Av	1.0 / 0.4 / -10.0	23.1	Neutral	N/A	-26.9
24.28	10.9 Av	1.0 / 0.4 / -10.0	22.3	Line 1	N/A	-27.7
30.00	6.9 Av	1.2 / 0.5 / -10.0	18.6	Neutral	N/A	-31.4

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Part 15.225 (c)

Frequency Tolerance over voltage and temperature

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Frequency Tolerance Measurements

Test Report #:	**BC300470**	Test Area:	Pinewood Site 1 (3m)	Temperature:	25.5	°C
Test Method:	Part 15.225 (c)	Test Date:	3-1-2004	Relative Humidity:	31	%
EUT Model #:	3000	EUT Power:	5VDC	Air Pressure:	80	kPa
EUT Serial #:	1			Page:		
Manufacturer:	Right Tag					
EUT Description:	RFID Reader					
Notes:						

Temperature Stability

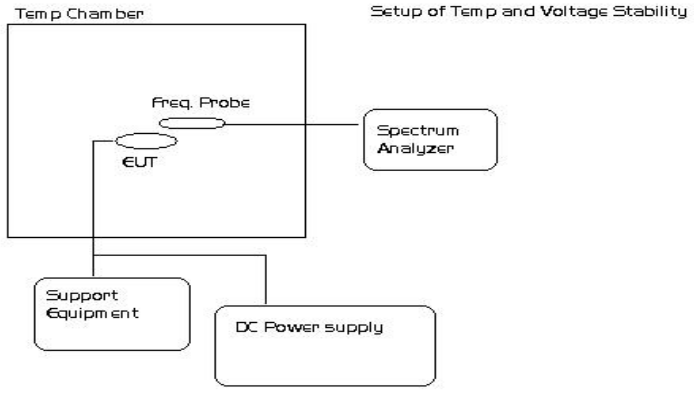
FREQ of Fundamental Ambient	FREQ of Fundamental -20 deg. C	FREQ of Fundamental +55 deg. C	Delta -20 Deg. C	Delta +55 Deg. C	Bandwidth Limit 0.01% Fc	Maximum Delta
(MHz)	(-20dBuV)	(-20dBuV)	(MHz)	(MHz)	(MHz)	(MHz)
13.56	13,559,565	13,560,517	0.000435	0.000517	0.0012553	0.001236

All temperatures in accordance to Part 2 of the CFR47 rules were investigated during test. The most extreme shifts are recorded above.

*Voltage Stability @ 20 Deg. C

FREQ of Fundamental V-Nom	FREQ of Fundamental 85% V-Nom	FREQ of Fundamental 115% V-Nom	Delta 85% V-Nom	Delta 115% V-Nom	Bandwidth Limit 0.01% Fc	Maximum Delta
(MHz)	(-20dBuV)	(-20dBuV)	(MHz)	(MHz)	(MHz)	(MHz)
13.56	13,559,580	13,560,530	0.000420	0.000530	0.0012553	0.0012023

*Only tested where the device is not powered from a battery source. In the case that the device is powered from a battery, a fresh battery was utilized during test.



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RSS-210

-20dBc Bandwidth

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-20dB Bandwidth Measurement

Test Report #:	**BC300470**	Test Area:	Pinewood Site 1 (10m)	Temperature:	25.5	°C
Test Method:	RSS-210	Test Date:	3-1-2004	Relative Humidity:	31	%
EUT Model #:	3000	EUT Power:	5VDC	Air Pressure:	80	kPa
EUT Serial #:	1			Page:		
Manufacturer:	Right Tag					
EUT Description:	RFID Reader					
Notes:						

FREQ of Fundamental	LEVEL Low Edge	LEVEL High Edge	Bandwidth Measured	Bandwidth Limit 0.25% Fc	DELTA2 (dB)
(MHz)	(-20dBuV)	(-20dBuV)	(MHz)	(MHz)	(MHz)
13,56	13,558,660	13,561,950	.003290	0.0339	0.3061

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Equipment Utilized During Test

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Project Report

Begin Date: 7/1/2004 **End Date:** 12/30/2004

Technician Mike Spataro **Project** BC300470

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
96	Hewlett-Packard	11947A	3107A00700	Transient Limiter	C Conducted Emissions	For Ver	2/10/2004	2/10/2005
141	EMCO	3825/2	9202-1945	LISN	C Conducted Emissions	For Ver	3/2/2004	3/2/2005
199	RHODE & SCHWARZ	ESH3	872318/036	Low Frequency Receiver (9 kHz - 30 MHz)	C Conducted Emissions	For Cal	12/27/2004	12/27/2005
6	Hewlett-Packard	8594E	3223A00145	Spectrum Analyzer	R Radiated Emissions	For Cal	1/16/2004	1/16/2005
76	WAVETEK	DM10XL	50714447	Hand Held Multimeter	R Radiated Emissions	For Ver	4/14/2004	4/14/2005
135	EMCO	3146	9402-3775	Log Periodic Antenna (200-1000MHz)	R Radiated Emissions	For Cal	9/18/2004	9/18/2005
182	ENVIRONTRONICS	System Plus		Humidity and Temperature Oven	R Radiated Emissions	For Cal	7/9/2005	7/9/2006
189	EMCO	3109	9801-3142	Bicon Antenna 30 - 300 MHz	R Radiated Emissions	For Cal	8/1/2003	8/1/2004
193	TENMA LABS	72-2085	9803546	DC power supply	R Radiated Emissions	No Svc Req		N/A
195	EMCO	6502	9205-2738	Magnetic loop	R Radiated Emissions	For Cal	6/2/2004	6/2/2005
248	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	For Ver	6/22/2004	6/22/2005

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Appendix B

Test Plan

and

Constructional Data Form

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Appendix C

Measurement Protocol

And

Test Procedures

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MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Conducted and radiated emission testing is performed according to the procedures in ANSI C63.4 & CNS13438.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dBµV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

To convert between dBµV and µV, the following conversions apply:

- dBµV = 20(log µV)
- µV = Inverse log(dBµV/20)

RADIATED EMISSIONS

The final level, expressed in dBµV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBµV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the applicable limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example: At a Test Frequency of 30 MHz, with a peak reading on the spectrum analyzer or measuring receiver of 14 dBmV:

Measured Level	+	Transducer & Cable Loss factor	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
(dBµV)		(dB)		(dBµV/m)	(dBµV/m)		(dBµV/m)		
14.0		**14.9**		**28.9**	**40.0**		**28.9**		**-11.1**

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DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω/50 µH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 22GHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.

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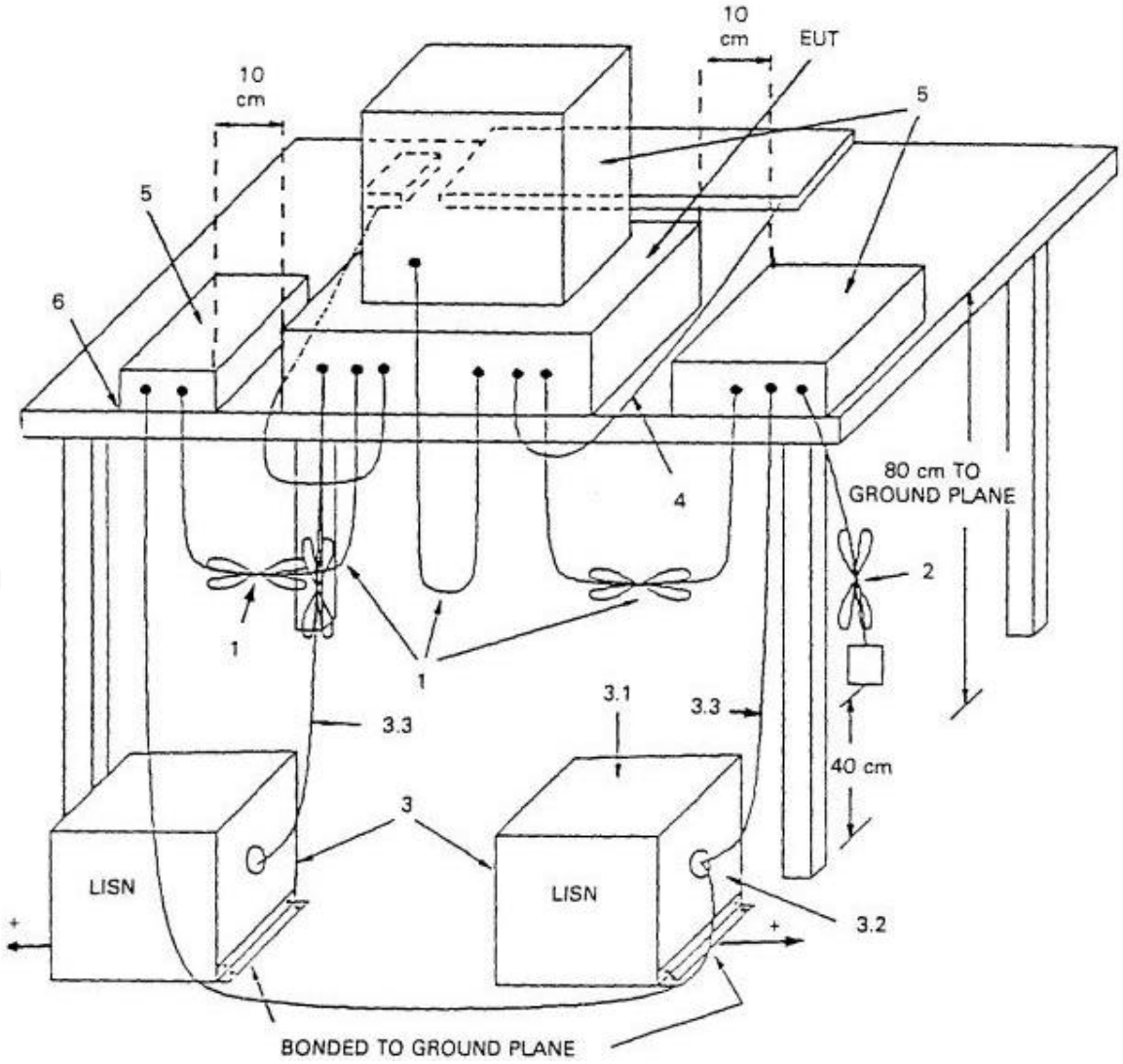
Conducted Emissions Diagram:



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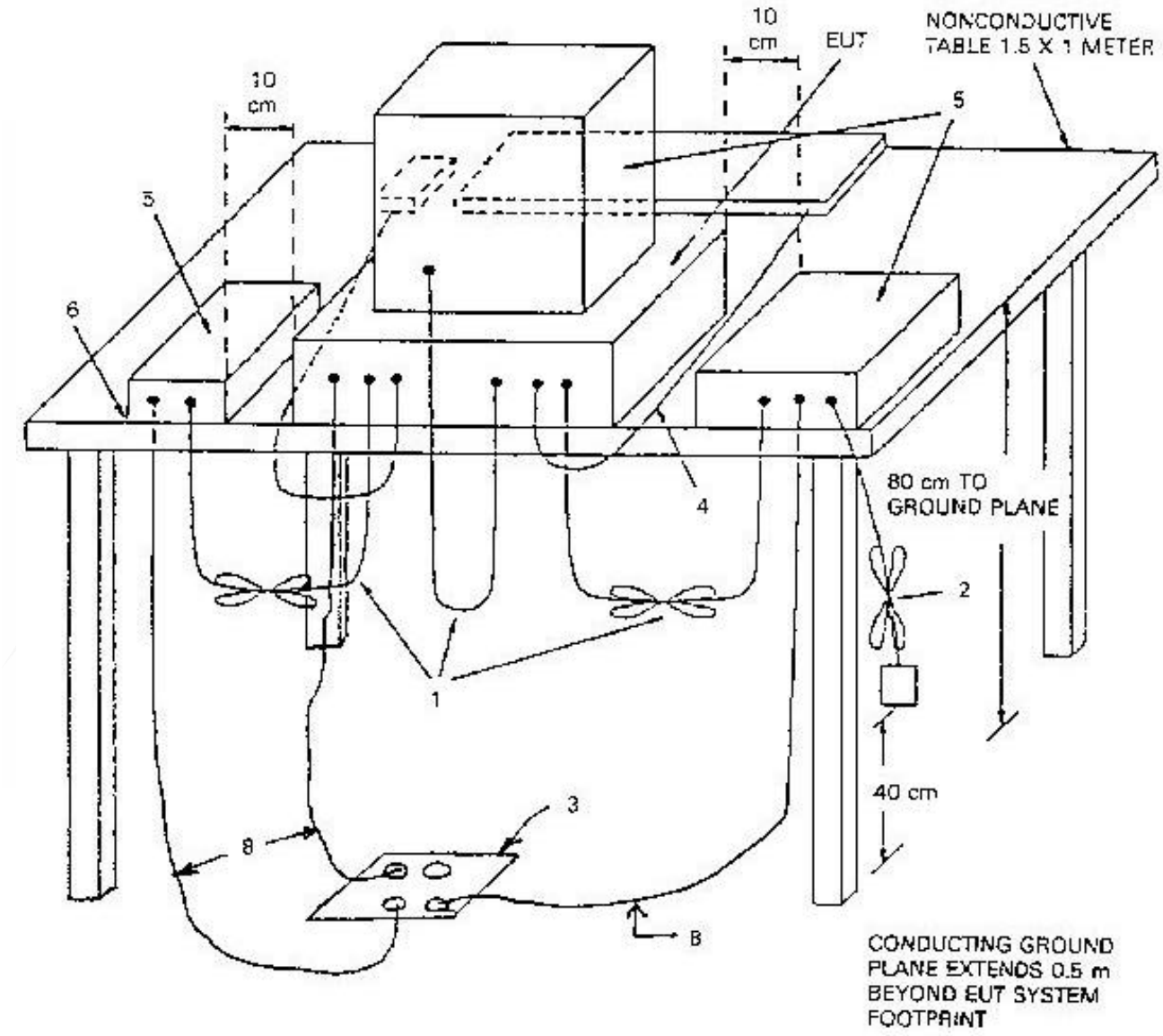
Radiated Emissions Diagram:



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