EMC EMISSIONS - TEST REPORT (Full)

Test Report No.	**3134545DEN-002** Issue Date: **Fri 12/October/2007**
Model / Serial No.	**MN: VNG-AI01B Robot and VNG-AI01RM Remote/SN: NA**
Product Type	**Wireless Robot and Remote**
Client	**Active Innovations LLC**
Manufacturer	**Active Innovations LLC**
License holder	**Active Innovations LLC**
Address	**9763 Goldfinch Ln**
	Highlands Ranch, CO 80129
Test Criteria Applied	**FCC CFR47 Part 15.249**
Test Result	**PASS**
Test Project Number	**3134545**
References	Title 47 CFR 15: RADIO FREQUENCY DEVICES
Total Pages Including Appendices:	**36**

Tested By : Michael Spataro

Reviewed By : Robert Cresswell

REVISION SUMMARY - The following changes have been made to this Report:

Rev.	Revision Statement	Author	Revision Date
	Initial Release of Document	See above	See above

D I R E C T O R Y

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: 19-Sept-2007

Testing Start Date: 19-Sept-2007

Testing End Date: 25-Sept-2007

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The tests were performed according to following regulations :

1. FCC CFR47 Part 15 subpart C
2. FCC CFR47 Part 15 subpart B

Emission Test Results:

Conducted Emissions, Powerline 15.207 - NA

Test Result

Minimum limit margin	0.0	dB	at	0.0	MHz

Remarks: EUT is battery powered.

Radiated Emissions 15.209/15.109 - PASS

Test Result

Minimum limit margin	-11.3	dB	at	1000.00	MHz

Remarks:

Radiated Emissions 15.249 (a) Fundamental - PASS

Test Result

Minimum limit margin	-1.0	dB	at	2479.98	MHz

Remarks: Robot High Channel

Radiated Emissions 15.249 (a) Harmonics of the Fundamental - PASS

Test Result

Minimum limit margin	-5.8	dB	at	7231.04	MHz

Remarks: Robot Low Channel

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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 Intertek.

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.

Sample:
☐Production ☐Prototype ☒See RFQ

Modifications required to pass: None

Test Specification Deviations: Additions to or Exclusions from: None

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Test-setup photo(s):
Conducted Emissions

Not Applicable

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Test-setup photo(s):
Radiated Emissions: Remote

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Test-setup photo(s):
Radiated Emissions: Remote

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Test-setup photo(s):
Radiated Emissions: Robot

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Test-setup photo(s):
Radiated Emissions: Robot

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Test-setup photo(s):
Radiated Emissions: Unintentional Emissions

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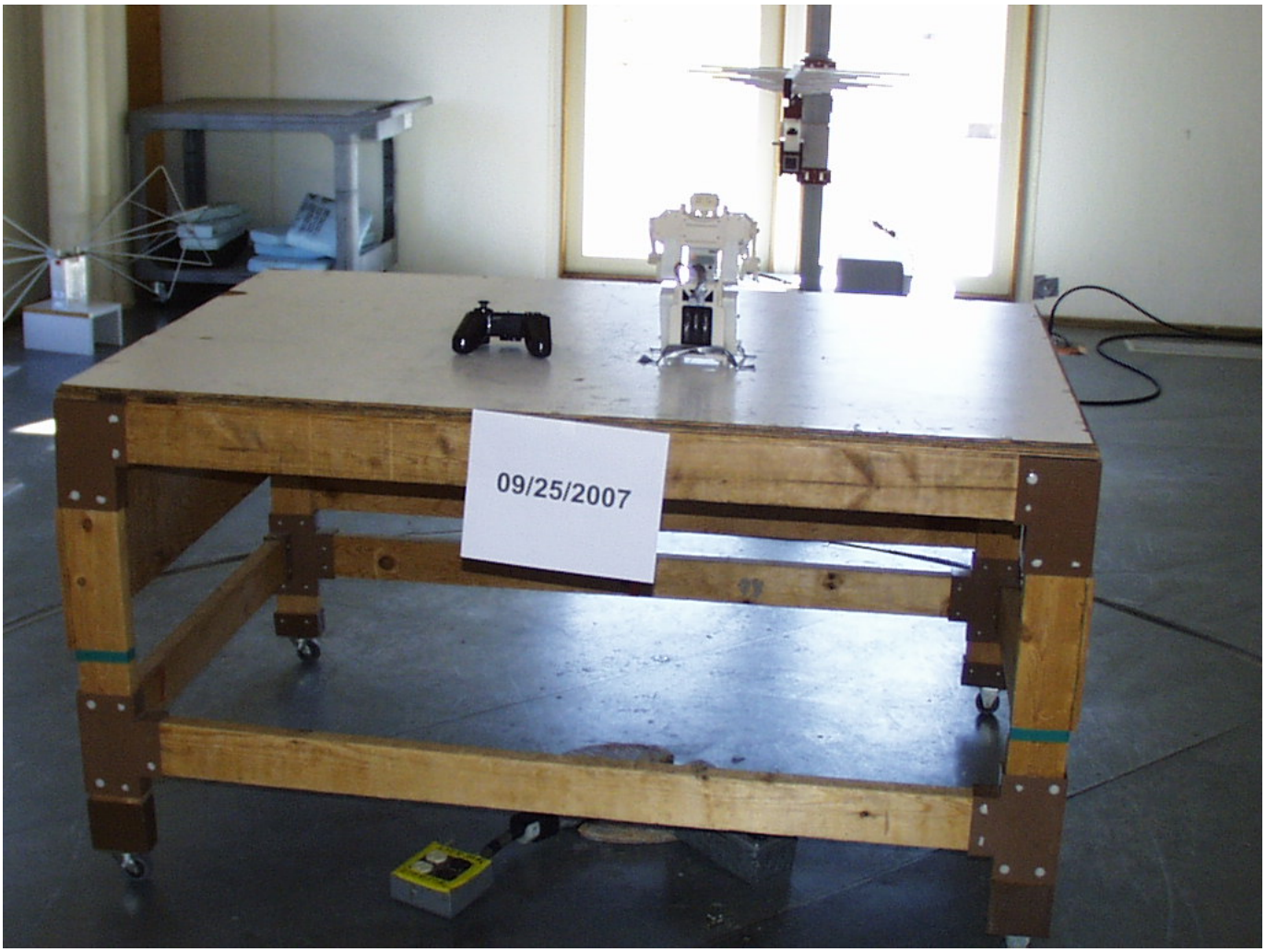
Test-setup photo(s):
Radiated Emissions: Unintentional Emissions



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Appendix A

Test Data Sheets

and

Test Equipment Used

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Radiated Unintentional Emission
15.109

And

Spurious Emission
15.249 (d)
15.209

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Radiated Electromagnetic Emissions

Test Report #:	**3134545**	Test Area:	Pinewood Site 1 (3m)	Temperature:	21.6	°C
Test Method:	FCC Part 15.209	Test Date:	20-Sep-2007	Relative Humidity:	33.7	%
EUT Model #:	VNG-AI01B Robot and VNG-AI01RM Remote	EUT Power:	9.6VDC	Air Pressure:	101	kPa
EUT Serial #:	NA					
Manufacturer:	Active Innovations					
EUT Description:	Wireless Robot and Remote					
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 <1GHz	15.209 >1GHz
1205.05	49.1 Av	2.5 / 24.5 / 37.4	38.6	V / 1.0 / 0.0	N/A	-15.4
1678.57	41.6 Av	3.0 / 25.8 / 37.1	33.4	V / 1.0 / 0.0	N/A	-20.6
2187.97	35.7 Av	3.5 / 27.8 / 37.8	29.2	V / 1.0 / 0.0	N/A	-24.8
1205.05	48.8 Av	2.5 / 24.5 / 37.4	38.3	V / 1.0 / 90.0	N/A	-15.7
1677.97	42.9 Av	3.0 / 25.8 / 37.1	34.6	V / 1.0 / 90.0	N/A	-19.4
2187.97	36.1 Av	3.5 / 27.8 / 37.8	29.6	V / 1.0 / 90.0	N/A	-24.4
2187.97	35.4 Av	3.5 / 27.8 / 37.8	28.9	V / 1.0 / 180.0	N/A	-25.1
1677.97	43.1 Av	3.0 / 25.8 / 37.1	34.8	V / 1.0 / 180.0	N/A	-19.2
1205.05	48.2 Av	2.5 / 24.5 / 37.4	37.8	V / 1.0 / 270.0	N/A	-16.2
1677.97	41.3 Av	3.0 / 25.8 / 37.1	33.0	V / 1.0 / 270.0	N/A	-21.0
The following were maximized between 1 and 4 GHz.						
2187.97	36.0 Av	3.5 / 27.8 / 37.8	29.5	V / 1.2 / 200.0	N/A	-24.5
1677.97 MHz was found to be an ambient and will be removed from the summary.						
1205.05	51.5 Av	2.5 / 24.5 / 37.4	41.1	V / 1.0 / 313.0	N/A	-12.9
No higher emissions found 1 to 4 GHz Horizontal.						
Noise floor.						
3000.00	35.6 Av	4.6 / 30.9 / 37.8	33.2	H / 1.0 / 0.0	N/A	-20.8
3999.98	35.1 Av	5.7 / 32.3 / 37.3	35.8	H / 1.0 / 0.0	N/A	-18.2
No higher emissions found 4 to 8 GHz, Vertical and Horizontal.						
Noise floor.						
4500.00	34.4 Av	6.6 / 32.3 / 40.4	32.9	V / 1.0 / 0.0	N/A	-21.1
6500.00	32.3 Av	8.5 / 35.3 / 40.3	35.7	V / 1.0 / 0.0	N/A	-18.3
No higher emissions found 8 to 18 GHz Horizontal of Vertical.						
Noise floor.						

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FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
8000.00	42.4 Av	8.3 / 37.1 / 47.3	40.5	V / 1.0 / 0.0	N/A	-13.5
10000.0	44.3 Av	9.5 / 38.1 / 49.2	42.7	V / 1.0 / 0.0	N/A	-11.3
18000.0	42.0 Av	0.0 / 46.2 / 46.2	42.0	V / 1.0 / 0.0	N/A	-12.0
No emissions found 18 to 24GHz.						
Noise floor.						
20000.0	1.9 Av	0.0 / 21.6 / 0.0	23.5	V / 1.0 / 0.0	N/A	-30.5
24000.0	2.3 Av	0.0 / 21.2 / 0.0	23.5	V / 1.0 / 0.0	N/A	-30.5

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FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
********** Measurement Summary **********						
10000.0	44.3 Av	9.5 / 38.1 / 49.2	42.7	V / 1.0 / 0.0	N/A	-11.3
18000.0	42.0 Av	0.0 / 46.2 / 46.2	42.0	V / 1.0 / 0.0	N/A	-12.0
1205.05	51.5 Av	2.5 / 24.5 / 37.4	41.1	V / 1.0 / 313.0	N/A	-12.9
8000.00	42.4 Av	8.3 / 37.1 / 47.3	40.5	V / 1.0 / 0.0	N/A	-13.5
3999.98	35.1 Av	5.7 / 32.3 / 37.3	35.8	H / 1.0 / 0.0	N/A	-18.2
6500.00	32.3 Av	8.5 / 35.3 / 40.3	35.7	V / 1.0 / 0.0	N/A	-18.3
1677.97	43.1 Av	3.0 / 25.8 / 37.1	34.8	V / 1.0 / 180.0	N/A	-19.2
1678.57	41.6 Av	3.0 / 25.8 / 37.1	33.4	V / 1.0 / 0.0	N/A	-20.6
3000.00	35.6 Av	4.6 / 30.9 / 37.8	33.2	H / 1.0 / 0.0	N/A	-20.8
4500.00	34.4 Av	6.6 / 32.3 / 40.4	32.9	V / 1.0 / 0.0	N/A	-21.1
2187.97	36.1 Av	3.5 / 27.8 / 37.8	29.6	V / 1.0 / 90.0	N/A	-24.4
20000.0	1.9 Av	0.0 / 21.6 / 0.0	23.5	V / 1.0 / 0.0	N/A	-30.5
24000.0	2.3 Av	0.0 / 21.2 / 0.0	23.5	V / 1.0 / 0.0	N/A	-30.5

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Radiated Electromagnetic Emissions

Test Report #:	**3134545**	Test Area:	Pinewood Site 1 (3m)	Temperature:	21.6	°C
Test Method:	FCC Part 15.209	Test Date:	25-Sep-2007	Relative Humidity:	33.7	%
EUT Model #:	VNG-AI01B Robot and VNG-AI01RM Remote	EUT Power:	9.6VDC	Air Pressure:	101	kPa
EUT Serial #:	NA					
Manufacturer:	Active Innovations					
EUT Description:	Wireless Robot and Remote					
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 <1GHz	N/A
38.95	33.5 Qp	0.6 / 12.1 / 28.0	18.2	V / 1.0 / 0.0	-21.8	N/A
44.29	34.9 Qp	0.7 / 11.4 / 28.0	18.9	V / 1.0 / 0.0	-21.1	N/A
71.99	35.9 Qp	0.8 / 9.0 / 27.9	17.8	V / 1.0 / 0.0	-22.2	N/A
80.01	35.4 Qp	0.9 / 7.4 / 27.9	15.8	V / 1.0 / 0.0	-24.2	N/A
160.00	30.1 Qp	1.4 / 12.5 / 27.5	16.5	V / 1.0 / 0.0	-27.0	N/A
38.95	33.6 Qp	0.6 / 12.1 / 28.0	18.3	V / 1.0 / 90.0	-21.7	N/A
44.29	35.0 Qp	0.7 / 11.4 / 28.0	19.1	V / 1.0 / 90.0	-20.9	N/A
80.01	35.8 Qp	0.9 / 7.4 / 27.9	16.2	V / 1.0 / 90.0	-23.8	N/A
44.29	34.9 Qp	0.7 / 11.4 / 28.0	19.0	V / 1.0 / 180.0	-21.0	N/A
71.99	34.4 Qp	0.8 / 9.0 / 27.9	16.3	V / 1.0 / 180.0	-23.7	N/A
80.01	36.0 Qp	0.9 / 7.4 / 27.9	16.4	V / 1.0 / 180.0	-23.6	N/A
44.29	34.3 Qp	0.7 / 11.4 / 28.0	18.4	V / 1.0 / 270.0	-21.6	N/A
The following were maximized between 30 and 200 MHz.						
38.95	34.5 Qp	0.6 / 12.1 / 28.0	19.3	V / 1.0 / 300.0	-20.7	N/A
44.29	35.5 Qp	0.7 / 11.4 / 28.0	19.6	V / 1.0 / 210.0	-20.4	N/A
80.01	36.2 Qp	0.9 / 7.4 / 27.9	16.6	V / 1.0 / 10.0	-23.4	N/A
No higher emissions found Horizontal 30 to 200 MHz.						
Noise floor.						
30.00	23.1 Qp	0.5 / 13.4 / 28.1	8.9	H / 2.0 / 270.0	-31.1	N/A
195.00	22.1 Qp	1.5 / 13.7 / 27.3	9.9	H / 2.0 / 270.0	-33.6	N/A
263.23	27.9 Qp	1.8 / 12.9 / 27.0	15.6	V / 1.0 / 0.0	-30.4	N/A
231.80	27.6 Qp	1.6 / 11.5 / 27.2	13.5	V / 1.0 / 90.0	-32.5	N/A
418.92	27.1 Qp	2.3 / 17.0 / 27.7	18.6	V / 1.0 / 90.0	-27.4	N/A

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FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	N/A
434.39	29.9 Qp	2.4 / 17.1 / 27.8	21.6	V / 1.0 / 90.0	-24.4	N/A
263.23	28.4 Qp	1.8 / 12.9 / 27.0	16.0	V / 1.0 / 180.0	-30.0	N/A
231.80	28.6 Qp	1.6 / 11.5 / 27.2	14.5	V / 1.0 / 270.0	-31.5	N/A
263.23	28.5 Qp	1.8 / 12.9 / 27.0	16.2	V / 1.0 / 270.0	-29.8	N/A
431.86	31.9 Qp	2.3 / 17.1 / 27.8	23.6	V / 1.0 / 270.0	-22.4	N/A
The following were maximized between 200 and 1000 MHz.						
431.66	34.8 Qp	2.3 / 17.1 / 27.8	26.4	V / 1.0 / 251.0	-19.6	N/A
263.23	35.2 Qp	1.8 / 12.9 / 27.0	22.9	V / 2.1 / 100.0	-23.1	N/A
No higher emissions found Horizontal 200 to 1000 MHz.						
Noise floor.						
200.00	24.8 Qp	1.5 / 11.8 / 27.3	10.7	H / 2.0 / 270.0	-32.8	N/A
500.00	23.1 Qp	2.6 / 19.4 / 28.2	17.0	H / 2.0 / 270.0	-29.0	N/A
1000.00	21.4 Qp	3.7 / 24.0 / 27.1	21.9	H / 2.0 / 270.0	-32.1	N/A
No emissions found 8 to 30 MHz with the loop antenna Parallel to the EUT.						
Noise floor.						
8.00	7.5 Qp	0.2 / 10.8 / 0.0	18.4	V / 1.0 / 0.0	-51.1	N/A
25.00	5.8 Qp	0.5 / 9.1 / 0.0	15.4	V / 1.0 / 0.0	-54.1	N/A
No emissions found 8 to 30 MHz with the loop antenna Perpendicular to the EUT.						
Noise floor.						
10.00	7.2 Qp	0.2 / 10.7 / 0.0	18.1	H / 1.0 / 0.0	-51.4	N/A
20.00	5.8 Qp	0.4 / 10.3 / 0.0	16.5	H / 1.0 / 0.0	-53.0	N/A

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FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	N/A
********** Measurement Summary **********						
431.66	34.8 Qp	2.3 / 17.1 / 27.8	26.4	V / 1.0 / 251.0	-19.6	N/A
44.29	35.5 Qp	0.7 / 11.4 / 28.0	19.6	V / 1.0 / 210.0	-20.4	N/A
38.95	34.5 Qp	0.6 / 12.1 / 28.0	19.3	V / 1.0 / 300.0	-20.7	N/A
71.99	35.9 Qp	0.8 / 9.0 / 27.9	17.8	V / 1.0 / 0.0	-22.2	N/A
431.86	31.9 Qp	2.3 / 17.1 / 27.8	23.6	V / 1.0 / 270.0	-22.4	N/A
263.23	35.2 Qp	1.8 / 12.9 / 27.0	22.9	V / 2.1 / 100.0	-23.1	N/A
80.01	36.2 Qp	0.9 / 7.4 / 27.9	16.6	V / 1.0 / 10.0	-23.4	N/A
434.39	29.9 Qp	2.4 / 17.1 / 27.8	21.6	V / 1.0 / 90.0	-24.4	N/A
160.00	30.1 Qp	1.4 / 12.5 / 27.5	16.5	V / 1.0 / 0.0	-27.0	N/A
418.92	27.1 Qp	2.3 / 17.0 / 27.7	18.6	V / 1.0 / 90.0	-27.4	N/A
500.00	23.1 Qp	2.6 / 19.4 / 28.2	17.0	H / 2.0 / 270.0	-29.0	N/A
30.00	23.1 Qp	0.5 / 13.4 / 28.1	8.9	H / 2.0 / 270.0	-31.1	N/A
231.80	28.6 Qp	1.6 / 11.5 / 27.2	14.5	V / 1.0 / 270.0	-31.5	N/A
1000.00	21.4 Qp	3.7 / 24.0 / 27.1	21.9	H / 2.0 / 270.0	-32.1	N/A
200.00	24.8 Qp	1.5 / 11.8 / 27.3	10.7	H / 2.0 / 270.0	-32.8	N/A
195.00	22.1 Qp	1.5 / 13.7 / 27.3	9.9	H / 2.0 / 270.0	-33.6	N/A
8.00	7.5 Qp	0.2 / 10.8 / 0.0	18.4	V / 1.0 / 0.0	-51.1	N/A
10.00	7.2 Qp	0.2 / 10.7 / 0.0	18.1	H / 1.0 / 0.0	-51.4	N/A
20.00	5.8 Qp	0.4 / 10.3 / 0.0	16.5	H / 1.0 / 0.0	-53.0	N/A
25.00	5.8 Qp	0.5 / 9.1 / 0.0	15.4	V / 1.0 / 0.0	-54.1	N/A

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Radiated Intentional Emission
15.249

Remote

&

Robot

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Field Strength Measurements
Fundamental and Spurious of the Transmitter

Test Report #:	**3134545**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22.2	°C
Test Method:	FCC CFR 47 part 15.249	Test Date:	19-Sep-2007	Relative Humidity:	35.5	%
EUT Model #:	VNG-AI01RM Remote	EUT Power:	9.6VDC	Air Pressure:	101	kPa
EUT Serial #:	NA			Page:		
Manufacturer:	Colorado Time Systems					
EUT Description:	Active Innovations					
Notes:	Wireless Robot Remote Control					

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

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Axis 1, EUT is flat on the table.								
Low Channel								
2410.23	52.0 Pk	3.9 / 28.5 / 0.0	84.4	V / 1.0 / 68.0	0.0	84.4	94	-9.6
2410.16	47.0 Pk	3.9 / 28.5 / 0.0	79.4	H / 1.4 / 244.7	0.0	79.4	94	-14.6
High Channel								
2480.13	48.9 Pk	4.0 / 28.7 / 0.0	81.6	H / 2.2 / 77.0	0.0	81.6	94	-12.4
2480.17	51.5 Pk	4.0 / 28.7 / 0.0	84.2	V / 1.0 / 54.0	0.0	84.2	94	-9.8
Axis 2, EUT is vertical on the table antenna is on top.								
High Channel								
2480.21	49.9 Pk	4.0 / 28.7 / 0.0	82.6	V / 1.0 / 193.0	0.0	82.6	94	-11.4
2480.3	51.0 Pk	4.0 / 28.7 / 0.0	83.8	H / 1.4 / 108.0	0.0	83.8	94	-10.2
Low Channel								
2410.19	53.8 Pk	3.9 / 28.5 / 0.0	86.2	H / 1.7 / 261.0	0.0	86.2	94	-7.8
2410.24	50.1 Pk	3.9 / 28.5 / 0.0	82.5	V / 1.3 / 176.0	0.0	82.5	94	-11.5
Axis 3, EUT is rotated 90 Deg.								
Low Channel								
2410.28	46.9 Pk	3.9 / 28.5 / 0.0	79.2	V / 1.3 / 144.0	0.0	79.2	94	-14.8
2410.48	52.3 Pk	3.9 / 28.5 / 0.0	84.7	H / 1.5 / 144.0	0.0	84.7	94	-9.3
High Channel								
2480.08	53.5 Pk	4.0 / 28.7 / 0.0	86.3	H / 1.7 / 268.0	0.0	86.3	94	-7.7
2480.17	49.1 Pk	4.0 / 28.7 / 0.0	81.8	V / 1.4 / 331.0	0.0	81.8	94	-12.2
EUT will be placed in Axis 3 for all harmonic measurements.								
No harmonics found from the EUT.								

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Field Strength Measurements
Fundamental and Spurious of the Transmitter

Test Report #:	**3134545**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22.2	°C
Test Method:	FCC CFR 47 part 15.249	Test Date:	19-Sep-2007	Relative Humidity:	35.5	%
EUT Model #:	VNG-AI01B Robot	EUT Power:	9.6VDC	Air Pressure:	101	kPa
EUT Serial #:	NA			Page:		
Manufacturer:	Colorado Time Systems					
EUT Description:	Active Innovations					
Notes:	Wireless Robot					

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

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
Low Channel								
2410.31	60.4 Pk	3.9 / 28.5 / 0.0	92.8	V / 1.1 / 300.0	0.0	92.8	94	-1.2
2410.71	56.6 Pk	3.9 / 28.5 / 0.0	89	H / 1.1 / 221.0	0.0	89	94	-5
4820.24	40.9 Pk	7.2 / 33.0 / 40.3	40.8	H / 1.0 / 73.0	0.0	40.8	54	-13.2
4820.55	40.6 Pk	7.2 / 33.0 / 40.3	40.5	V / 1.0 / 10.0	0.0	40.5	54	-13.5
7230.54	43.7 Pk	8.1 / 36.3 / 40.5	47.6	H / 1.4 / 185.0	0.0	47.6	54	-6.4
7231.04	44.3 Pk	8.1 / 36.3 / 40.5	48.2	V / 1.0 / 345.0	0.0	48.2	54	-5.8
No emissions found 4th to the 10th harmonics Horizontal.								
No emissions found 4th to the 10th harmonics Vertical.								
High Channel								
2479.98	60.3 Pk	4.0 / 28.7 / 0.0	93	V / 1.1 / 265.0	0.0	93	94	-1
2480.07	58.9 Pk	4.0 / 28.7 / 0.0	91.6	H / 1.4 / 45.0	0.0	91.6	94	-2.4
4960.52	28.9 Pk	7.5 / 33.3 / 40.2	29.5	V / 1.0 / 10.0	0.0	29.5	54	-24.5
4960.62	35.8 Pk	7.5 / 33.3 / 40.2	36.4	H / 1.0 / 155.0	0.0	36.4	54	-17.6
7441.09	44.2 Pk	8.2 / 36.5 / 40.4	48.5	V / 1.3 / 355.0	0.0	47.6	54	-6.4
7441.09	42.8 Pk	8.2 / 36.5 / 40.4	47.1	H / 1.2 / 32.0	0.0	48.2	54	-5.8
No emissions found 4th to the 10th harmonics Horizontal.								
No emissions found 4th to the 10th harmonics Vertical.								

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List of Equipment Utilized for Final Test

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Project Report

Begin Date: 9/19/2007 **End Date:** 9/25/2007

Technician Mike Spataro **Project** 3134545

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
18805	Hewlett-Packard	11970K	2332A01280	Harmonic Mixer	R Radiated Emissions	For Cal	2/24/2006	2/24/2009
18806	Hewlett-Packard	11970A	3003A07640	Harmonic Mixer	R Radiated Emissions	For Cal	2/24/2006	2/24/2009
18880	Hewlett-Packard	85650A	2811A01300	Q.P Adapter	R Radiated Emissions	For Cal	2/16/2007	2/16/2008
18882	Hewlett-Packard	8566B	2410A00154	Spectrum Analyzer (dc-22 GHz)	R Radiated Emissions	For Cal	12/7/2006	12/7/2007
18887	EMCO	3115	9205-3886	Horn Antenna 1-18GHz	R Radiated Emissions	For Cal	3/6/2007	3/6/2008
18888	EMCO	3146	9402-3775	Log Periodic Antenna (200-1000MHz)	R Radiated Emissions	For Cal	10/31/2006	10/31/2007
18889	EMC TEST SYSTEMS	3109	3142	Biconical Antenna 30-300MHz	R Radiated Emissions	For Cal	10/31/2006	10/31/2007
18897	EMCO	6502	9205-2738	Magnetic loop	R Radiated Emissions	For Cal	8/27/2007	8/27/2008
18900	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	For Ver	5/1/2007	5/1/2008
18901	Avantek	AWT-18037	1002	RF Pre-Amplifier (8-18 GHz)	R Radiated Emissions	For Ver	5/1/2007	5/1/2008
18906	Mini-Circuits Lab	ZHL-42	N052792-2	Amplifier	R Radiated Emissions	For Ver	5/1/2007	5/1/2008
18912	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	For Ver	5/1/2007	5/1/2008
18913	Hewlett-Packard	E7405A	My44211889	Spectrum Analyzer	R Radiated Emissions	For Cal	2/23/2007	2/23/2008

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Appendix B

Test Plan

and

Constructional Data Form

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Request for Estimate & Test Plan

Please contact with any questions:

Contact:	Bryant Hart
Title:	Account Manager
Phone Number:	(303) 402-5272
Email Address:	Bryant.Hart@Intertek.com

Client Information:

License Holder:	Active Innovations
Address:	
Contact:	Charles Grasso
Title:	EMC Engineer
Phone Number:	303-204-2974
Fax Number:	N/a
Email Address:	chasgrasso@gmail.com

Please fill out the pertinent pages within this document and email this Form to Bryant and Amy at Bryant.Hart@intertek.com and Amy.Baumberger@Intertek.com for a quotation. Other pages that do not pertain to your device can be left blank.

I.E. EMC Quote – Pages 1,2 & 3, Add Safety – add Page 4, If a radio is part of the device add page 5 etc.

This document is compiled as a WORD FORM. To enable the FORM tool, right click on the tool bar and select FORMS. You will then be able to add attachments, drawings etc by clicking on the "Lock" Graphic to unlock the FORM document. To make all the check boxes work within the FORM, the "Lock" graphic must be selected. Thank you for all your time and effort on this matter.

Estimates Requested: (Required for all devices)

EMC Testing/Services	
☒ Requesting Estimate	☐ On-site/In-Situ Testing
☐ Pre-Compliance Scans / Engineering test	☐ TCF Compilation/Review Service

Radio Device Testing and Certification	
☒ FCC Certification : **Radio Job**	☐ Industry Canada Certification (Receivers required)
☐ Class 2 Notification Under the R&TTED	☐ TCF Compilation/Review Service

Safety Testing and Certification	
☐ NRTL Listing	☐ 1 Day Pre-Assessment (conducted at your facility)
☐ Letter of Findings	☐ CB Report Covering all country Deviations
☐ CE Report to Cover the LVD/MDD	☐ CB Report Covering - Specify Countries:

Any Additional Interest(s)	
☐ ISO Certification (Another RFQ is required)	☐ Energy Star Compliance
☐ FDA 510K Services (Another RFQ is required)	☐ NEBS
☐ International Approvals Management	☐ Wire and Cable
☐ Product Verification and Integrity Testing	☐ Other:

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General Product Information: (Required for all Devices)

Product/Model Number(s):	PROTO1
Description of product(s):	R.F Remote
Intended Use:	☒ Household/Office ☐ Commercial ☐ Industrial ☐ Hospital ☐ Life Supporting
Intended Location:	☐ Dry ☐ Damp ☐ Wet ☐ Hazardous Location
Product Type:	☒ Prototype ☐ Production Sample ☐ Manufacturing Design Change: Please Describe
Is it a stand-alone device or part of a system?	☒ Stand Alone Device ☐ Component of a System
If part of a system, please describe system parts and accessories:	
If there is more than one product/model what are the differences?	
Is the Product Enclosure:	☐ Metal ☒ Plastic ☐ Both

Size:	Length:(small)	Width:	Height:	Weight:

What Voltages/Current does the EUT run at? (AC/DC etc.) – if the unit runs off of DC though it is supplied with an AC/DC converter, please state the operating parameters of the converter.	Rated Voltage: Rated Current: # of Phases/Conductors: / # of Power Cords:
Are their multiple suppliers of power supplies?	☐ Yes ☒ No If Yes Please Describe:
Are there Multiple Modes of Operation? ☒ Yes ☐ No If Yes Please Describe: Different carrier frequencies	
Is there programmable software? ☐ Yes ☒ No	
Can all modes of operation be operated simultaneously? ☐ Yes ☒ No Explain: Frequencies are hardware selectable.	
In which countries will you be selling the product? USA	
When can you supply samples of the device and all pertinent documentation (where applicable) to Intertek for testing? Negotiable	

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EMC Information: (Required only if EMC work is requested)

What EMC certifications are desired?	
☒ FCC/ICES (US & Canada)	☐ SII (Israel)
☐ CE / EMC / MMD	☐ AS/NZS (Australia/New Zealand)
☐ BSMI (Taiwan)	☐ Korea MIC Certification / RRL
☐ VCCI (Japan)	☐ Other: Please Specify

Highest frequency utilized for device operation: To be supplied

List of Clock Frequencies: N/A

What is the time that it takes for the device to complete a full cycle of operation? (time required to identify any degradation in performance) (please list per mode of operation) N/A

Total Number of I/O Cables: # Greater than 3m (9.75 feet) in Length # Greater than 30m (97.5 feet) in Length # of cables at a longer length (specify)	N/A

Number of Dedicated Earth Equalization Ports N/A

Number of Ethernet and/or Telecommunications Ports N/A

When the device is a compilation of subsystems (in separate chassis) how many interconnecting I/O's are greater than 1 meter in length between the Subsystem chassis? N/A

CISPR11/EN 55011 Specific Devices:

1. Does the EUT use RF Energy to affect a material? ☐ Yes ☒ No If yes, state frequency of energy:

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General Safety Information: (Required only if Safety Listing/Certification/Testing is requested)

What Safety certifications are desired?	
☐ NRTL Listing US/Canada	☐ Limited Production Certification/Listing
☐ CB Certification (Worldwide – Outside US/Can)	☐ S Mark
☐ EU Investigation (EU – LVD/MDD)	☐ GS Mark
☐ Field Label (Onsite Inspection)	☐ Other: Please Specify

Please list all applicable safety standards that you would like your device certified under:

Has the device been tested and certified for product safety before? A. If it has been previously tested, to which standard and by which organization? B. Can you provide the test report?	☐ Yes ☐ No Standard tested to: Organization tested by: ☐ Yes ☐ No

Do manuals and installation instructions exist? (Not always a necessity for quoting but most useful for complex products)	☐ Yes ☐ No

Power Supply Safety Information: A. Is the power supply an approved "off-the-shelf" supply? B. Can you provide the test report/CB Report?	☐ Yes ☐ No Standard tested to: Organization tested by: ☐ Yes ☐ No

Does the device contain batteries?	What Type? How Many?

What technology is used? (i.e., lasers, X Ray, etc.)	

If Laser:	Class:	Output Power:	Beam Divergence Angle:	Wavelength:

Preferred testing location:	☐ Intertek Lab ☐ Customer site ☐ Intertek Local Lab (May increase turn around time and expense)

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Radio Information: (Required only if the device contains an intentional transmitter)

What Radio certifications are desired?	
☒ FCC (USA) ☐ Industry Canada ☐ ETSI (R&TTE)	☐ Notified or Competent Body TCF Review ☐ Other: Please Specify

Please list the particular radio standards that apply. 15.249

Operating Frequency:	Between 2.4 and 2.5G (Note: Two frequencies will be selected. To be delivered at test time)
RF Output Power:	
Is there an RF Conducted Port?	☐ Yes ☒No Description:
Number of Antennas & Description: (Internal, External, Known Gain, etc.)	Internal
Modulation Technique:	GFSK (Gaussian FSK)
Number of Channels/Number of Discrete frequencies per Channel:	Two/One
Can the device be operated in CW Mode?	☒ Yes ☐ No
What is the lowest utilized frequency within the device?	To be supplied

Notes: Please ensure to bring a notch filter covering your fundamental operating frequency.

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Additional Information:

This information is required to be filled in to act as a test plan and constructional data form required to be supplied as part of the test report in accordance to the required standards. This information is not required to obtain a quote but should be filled out to show a completed report under the applicable standards for EMC etc. Thank you for your time in effort in completing this section of the RFQ/Test Plan.

Support Equipment:

Intertek requires our customers provide all support equipment necessary to fully operate the device undergoing testing. This includes any filters required for testing radio devices, computer equipment, etc.

Item	Description	Manufacturer	Model No.
1			
2			
3			
4			

Cabling Information:

Cable	Function*	Type of Shield	Length	Connectors	Connection**
1					
2					
3					
4					
5					
6					

* Function examples (Ethernet, RS232, USB, Analog, physiological parameter, etc.)
** Connection examples (Outside Plant, Patient Coupled, Ring Voltage, etc.)

Monitoring the EUT:

Please provide instructions below on how to observe the EUT to verify proper operation in all modes. (including software revision)

Any other information required: (Notes, Photos, Block Diagrams, Drawings, etc.)

A minimum of a block diagram showing the equipment under test and its support equipment.

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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 dBμV:

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 C63.4-2003 - "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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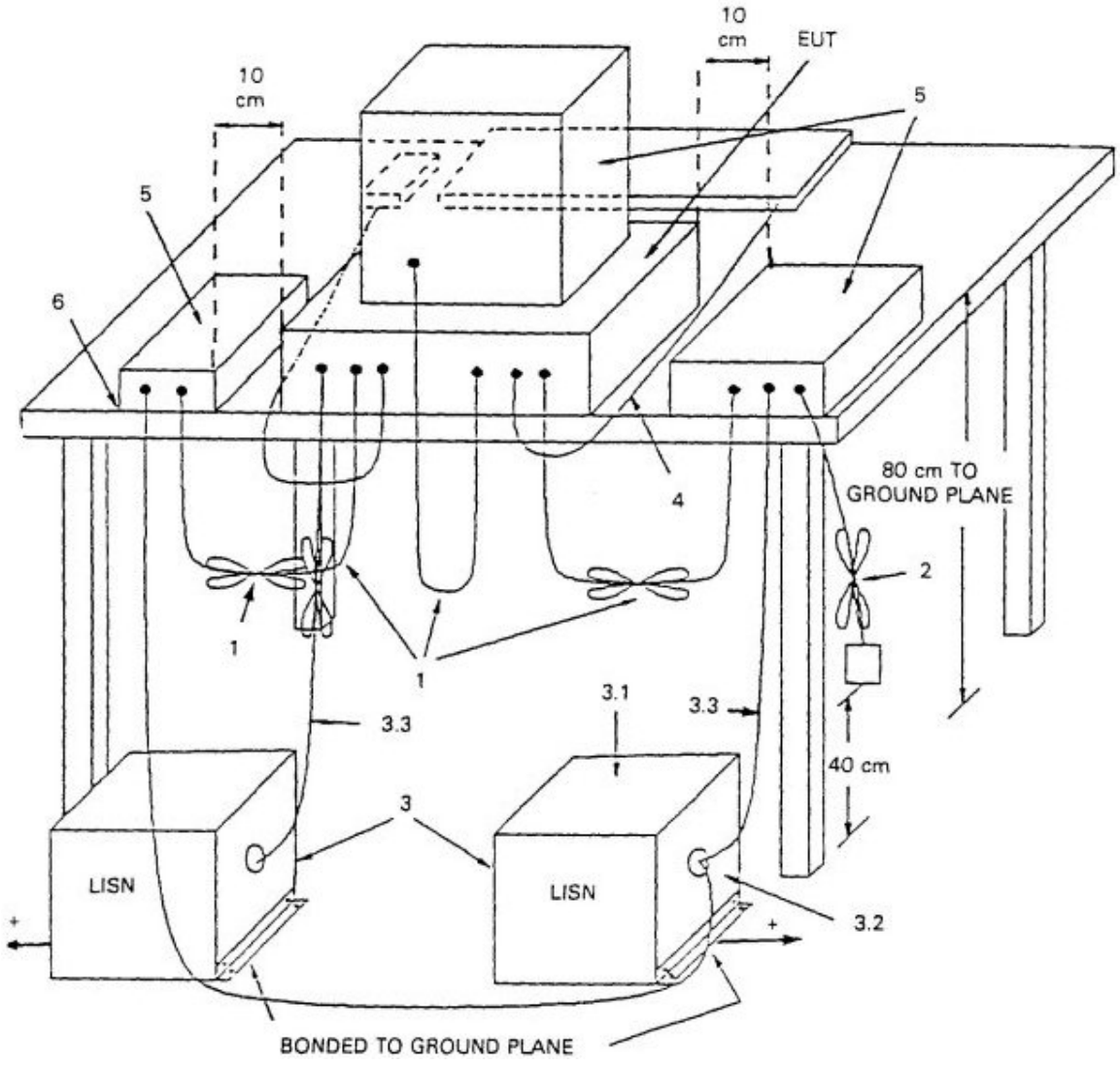
Conducted Emissions Diagram:



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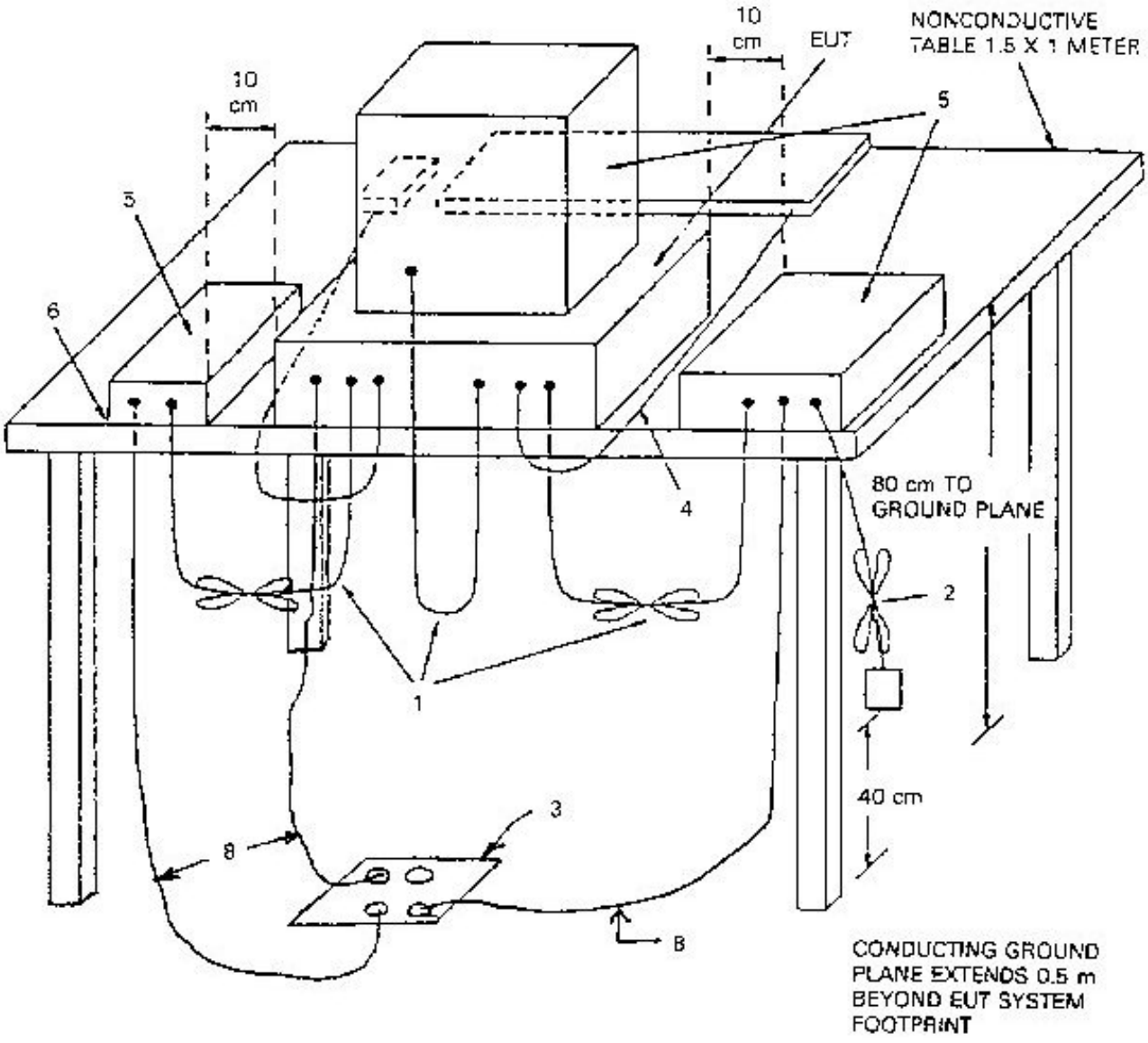
Radiated Emissions Diagram:



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