

*FCC PART 15, SUBPART B AND C
TEST METHOD: ANSI C63.4-1992*

for

RF ID READER

MODEL: MINI TRACKER II

Prepared for

AVID MARKETING, INC.
3179 HAMNER AVENUE
NORCO, CALIFORNIA 91760

Prepared by:_____

KYLE FUJIMOTO

Approved by:_____

MICHAEL CHRISTENSEN

COMPATIBLE ELECTRONICS INC.
114 OLINDA DRIVE
BREA, CALIFORNIA 92823
(714) 579-0500

DATE: OCTOBER 9, 2001

	REPORT BODY	APPENDICES				TOTAL
		A	B	C	D	
PAGES	14	2	2	10	4	32

This report shall not be reproduced except in full, without the written approval of Compatible Electronics.



TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	4
1. PURPOSE	5
2. ADMINISTRATIVE DATA	6
2.1 Location of Testing	6
2.2 Traceability Statement	6
2.3 Cognizant Personnel	6
2.4 Date Test Sample was Received	6
2.5 Disposition of the Test Sample	6
2.6 Abbreviations and Acronyms	6
3. APPLICABLE DOCUMENTS	7
4. Description of Test Configuration	8
4.1 Description of Test Configuration - EMI	8
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	10
5.1 EUT and Accessory List	10
5.2 EMI Test Equipment	11
6. TEST SITE DESCRIPTION	12
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
7. Test Procedures	13
7.1 Radiated Emissions (Spurious and Harmonics) Test	13
8. CONCLUSIONS	14



LIST OF APPENDICES

APPENDIX	TITLE
A	Modifications to the EUT
B	Additional Models Covered Under This Report
C	Diagrams, Charts and Photos <ul style="list-style-type: none">• Test Setup Diagrams• Radiated Emissions Photos• Antenna and Effective Gain Factors
D	Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Plot Map And Layout of Test Site



GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested: RF ID Reader
Model: Mini Tracker II
S/N: 048977

Product Description: See Expository Statement.

Modifications: The EUT was not modified during the testing.

Manufacturer: Avid Marketing, Inc.
3179 Hamner Avenue
Norco, California 91760

Test Date: October 9, 2001

Test Specifications: EMI requirements
CFR Title 47, Part 15, Subpart B, Class A; and
CFR Title 47, Part 15, Subpart C, Sections 15.205 and 15.209

Test Procedure: ANSI C63.4: 1992

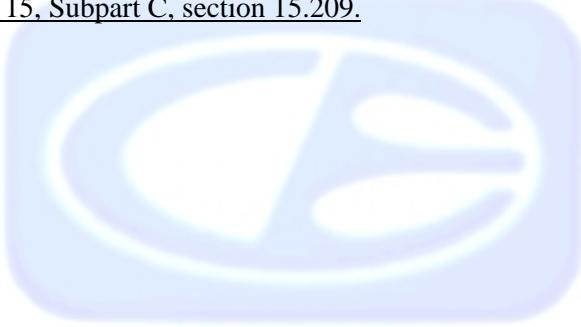
Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 450 kHz - 30 MHz	Not tested because the EUT operates on a 9V battery only.
2	Radiated RF Emissions, 10 kHz - 30 MHz	Complies with the general radiated emissions limits of FCC Title 47, Part 15, Subpart C, section 15.209.
3	Radiated RF Emissions, 30 MHz - 1000 MHz	Complies with the Class A limits of FCC Title 47, Part 15, Subpart B.

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the RF ID Reader Model: Mini Tracker II. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the Class A specification limits defined by FCC Title 47, Part 15, Subpart B and the general radiated emissions limits of FCC Title 47, Part 15, Subpart C, section 15.209.



2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Avid Marketing, Inc.

Michael F. Cruz Director of Engineering

Compatible Electronics Inc.

Kyle Fujimoto Test Engineer
Michael Christensen Test Engineer

2.4 Date Test Sample was Received

The test sample was received on October 5, 2001.

2.5 Disposition of the Test Sample

The test sample was returned to Avid Marketing, Inc. on October 9, 2001.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
CFR	Code of Federal Regulations



3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
CFR Title 47, Subpart B	FCC Rules – Radio frequency devices (including digital devices) – Unintentional Radiators
CFR Title 47, Subpart C	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
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.



4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The RF ID Reader Model: Mini Tracker II (EUT) connected to the computer via its serial port. The computer was connected to a printer, monitor, keyboard, and mouse via its parallel, video, keyboard, and mouse ports, respectively. The EUT was continuously transmitting during the test. The characters on the EUT's display were also sent to the computer via the serial port, and displayed on the computer's monitor.

Final radiated data was taken in the mode above.



4.1.1 **Cable Construction and Termination**

Cable 1

This is a 3 meter foil shielded round cable connecting the EUT to the computer. It has a D-9 pin metallic connector at the computer end and is hard wired into the EUT. The cable was bundled to a length of 1 meter. The shield of the cable was grounded to the chassis via the connector.

Cable 2

This is a 6 foot braid and foil shielded round cable connecting the computer to the printer. It has a Centronics type metallic connector at the printer end and a D-25 pin metallic connector at the computer end. The cable was bundled to a length of 1 meter. The shield of the cable was grounded to the chassis via the connectors.

Cable 3

This is a 5 foot foil shielded round cable connecting the computer to the mouse. It has a 6 pin mini DIN connector at the computer end and is hard wired into the mouse. The shield of the cable was grounded to the chassis via the connector.

Cable 4

This is a 5 foot foil shielded round cable connecting the computer to the keyboard. It has a 6 pin mini DIN connector at the computer end and is hard wired into the keyboard. The shield of the cable was grounded to the chassis via the connector.

Cable 5

This is a 3.5 foot foil shielded round cable connecting the computer to the monitor. It has a high density D-15 pin metallic connector at the computer end and is hard wired into the monitor. The cable was bundled to a length of 1 meter. The shield of the cable was grounded to the chassis via the connector. The cable also had a molded ferrite at the computer end.



5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
RF ID READER (EUT)	AVID MARKETING, INC.	MINI TRACKER II	048977	IOL-134-AV1027I
COMPUTER	DELL	MCM	CLFHF	DoC
MONITOR	DIGIVIEW	HR-1434	15B818310	AMPJD144
KEYBOARD	N/A	N/A	2K07050860	DoC
MOUSE	LOGITECH	M-CAA43	LZE10807511	DoC
PRINTER	CITIZEN	LSP-10	1184398-7Z	DLK66TLSP-10



5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
Radiated Emissions Data Capture Program	Compatible Electronics	VER. 2.3 (SR19)	N/A	N/A	N/A
Spectrum Analyzer Main Section	Hewlett Packard	8566B	2727A04757	November 11, 2000	1 Year
Spectrum Analyzer Display Section	Hewlett Packard	85662A	2648A15455	November 11, 2000	1 Year
Quasi-Peak Adapter	Hewlett Packard	85650A	3303A01688	November 10, 2000	1 Year
Preamplifier	Com Power	PA-102	1202	October 16, 2000	1 Year
Biconical Antenna	Com Power	AB-900	15011	July 9, 2001	1 Year
Log Periodic Antenna	Com Power	AL-100	1012	July 9, 2001	1 Year
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Hewlett Packard	HP98561A	2522A05178	N/A	N/A
Printer	Hewlett Packard	2225A	2925S33268	N/A	N/A
Plotter	Hewlett Packard	7440A	8726K38417	N/A	N/A
Loop Antenna	Com-Power	AL-130	17070	May 21, 2001	1 Year



6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.



7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1

Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. The Com Power PA-102 Preamplifier was used to increase the sensitivity of the instrument. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets. The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 1992. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The loop antenna was rotated in the horizontal and vertical axis in order to ensure accurate results.

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain final test data.



8. CONCLUSIONS

The RF ID Reader Model: Mini Tracker II meets all of the Class A specification limits defined in FCC Title 47, Part 15, Subpart B, and the general radiated emissions limits of FCC Title 47, Part 15, Subpart C, section 15.209.



APPENDIX A

MODIFICATIONS TO THE EUT



MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B or FCC section 15.209 specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

Modifications:

No modifications were made to the EUT.



APPENDIX B

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***



ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

RF ID Reader
Model: Mini Tracker II
S/N: N/A

There were no additional models covered under this report.



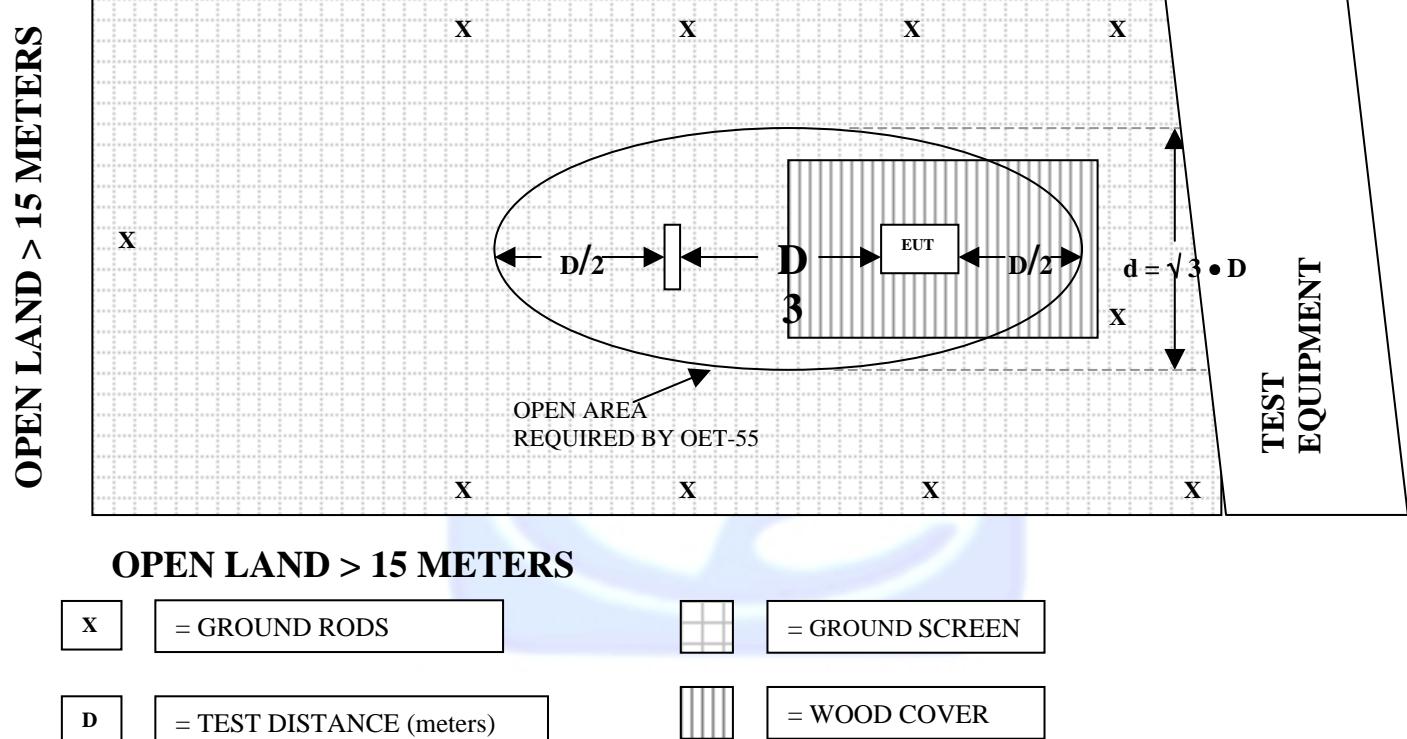
APPENDIX C

DIAGRAMS, CHARTS AND PHOTOS



FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED SITE

OPEN LAND > 15 METERS



**FRONT VIEW**

AVID MARKETING, INC.
RF ID READER
MODEL: MINI TRACKER II
FCC SUBPART B - RADIATED EMISSIONS – 10-09-01

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



**REAR VIEW**

AVID MARKETING, INC.
RF ID READER
MODEL: MINI TRACKER II
FCC SUBPART B - RADIATED EMISSIONS – 10-09-01

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



**FRONT VIEW**

AVID MARKETING, INC.
RF ID READER
MODEL: MINI TRACKER II
FCC SUBPART C - RADIATED EMISSIONS – 10-09-01

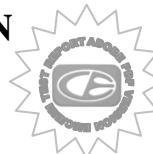
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



**REAR VIEW**

AVID MARKETING, INC.
RF ID READER
MODEL: MINI TRACKER II
FCC SUBPART C - RADIATED EMISSIONS – 10-09-01

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



COM-POWER AB-900

BICONICAL ANTENNA

S/N: 15011

CALIBRATION DATE: JULY 9, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	11.20	120	13.40
35	10.80	125	12.50
40	12.20	140	11.80
45	11.00	150	11.70
50	10.90	160	12.90
60	10.90	175	14.80
70	7.90	180	16.10
80	6.30	200	16.10
90	9.00	250	15.60
100	11.50	300	18.60



COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 1012

CALIBRATION DATE: JULY 9, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	15.70	700	23.50
400	13.20	800	22.70
500	16.20	900	23.20
600	18.60	1000	25.30



COM-POWER PA-102

PREAMPLIFIER

S/N: 1202

CALIBRATION DATE: OCTOBER 16, 2000

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	35.8	300	35.4
40	35.9	350	35.2
50	35.9	400	35.1
60	35.8	450	35.1
70	35.7	500	34.9
80	35.7	550	34.9
90	35.5	600	34.7
100	35.7	650	34.6
125	35.7	700	34.2
150	35.7	750	34.1
175	35.7	800	34.1
200	35.6	850	33.9
225	35.5	900	33.6
250	35.5	950	33.4
275	35.5	1000	33.3



Com-Power Corporation

(949) 587-9800

Antenna Calibration

Frequency MHz	Magnetic (dB/m)	Electric (dB/m)
0.009	-40.5	11.0
0.01	-40.4	11.1
0.02	-41.4	10.1
0.03	-40.0	11.5
0.04	-40.4	11.1
0.05	-41.7	9.8
0.06	-41.2	10.3
0.07	-41.5	10.0
0.08	-41.8	9.7
0.09	-41.8	9.7
0.1	-41.8	9.7
0.2	-44.0	7.5
0.3	-41.6	9.9
0.4	-41.6	9.9
0.5	-41.6	9.9
0.6	-41.5	10.0
0.7	-41.4	10.1
0.8	-41.3	10.2
0.9	-41.3	10.2
1	-40.9	10.6
2	-40.3	11.2
3	-40.5	11.0
4	-40.8	10.7
5	-40.2	11.3
6	-40.0	11.5
7	-40.4	11.1
8	-40.5	11.0
9	-40.0	11.5
10	-40.7	10.8
12	-41.2	10.3
14	-41.3	10.2
15	-41.3	10.2
16	-41.4	10.1
18	-41.4	10.1
20	-41.4	10.1
25	-41.7	9.8
30	-43.1	8.4

Separation Distance

21700

APPENDIX D

DATA SHEETS



Company Name:	Avid Marketing	DATE:	10/9/01
EUT:	RF ID Reader	EUT S/N:	A048977
EUT MODEL:	Mini Tracker II	LOCATION:	Lab A
SPECIFICATION:	FCC PART 15.209	CLASS:	A



COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics Page : 1/1
Customer : AVID INC Date : 10/09/2001
Manufacturer : AVID INC. Time : 10: 53: 26
Eut name : Mini Tracker II Lab : A
Model : ISO-FDXB Read Test Distance : 10
Serial # : A048977
Specification : FCC Class A
Distance correction factor (20 * log(test/spec)) : 0.00
Test Mode :

Pol	Freq	Rdng	Cable loss	Ant factor	Amp gain	Cor' d	Li mit	Delta
	MHz	dBuV	dB	dB	dB	rdg = R	dBuV/m	R-L
1V	51. 603	55. 00	0. 92	10. 90	35. 88	30. 93	39. 10	- 8. 17
2V	64. 450	55. 30	1. 00	9. 51	35. 75	30. 05	39. 10	- 9. 05
3V	77. 362	62. 10	1. 07	6. 70	35. 70	34. 18	39. 10	- 4. 92
4V	154. 635	62. 30	1. 72	12. 27	35. 70	40. 59	43. 50	- 2. 91
5V	154. 638Qp	61. 81	1. 72	12. 27	35. 70	40. 10	43. 50	- 3. 40
6V	167. 524	61. 20	1. 77	13. 87	35. 70	41. 15	43. 50	- 2. 35
7V	167. 529Qp	60. 91	1. 77	13. 87	35. 70	40. 86	43. 50	- 2. 64
8V	180. 413	58. 30	1. 85	16. 10	35. 68	40. 57	43. 50	- 2. 93
9V	180. 413Qp	57. 81	1. 85	16. 10	35. 68	40. 08	43. 50	- 3. 42
10V	193. 286	59. 50	1. 95	16. 10	35. 63	41. 92	43. 50	- 1. 58
11V	193. 294Qp	59. 09	1. 95	16. 10	35. 63	41. 51	43. 50	- 1. 99
12V	206. 173	56. 60	2. 05	16. 03	35. 57	39. 11	43. 50	- 4. 39
13V	219. 096	56. 70	2. 15	15. 90	35. 52	39. 23	46. 40	- 7. 17
14V	270. 615	49. 10	2. 38	16. 90	35. 50	32. 89	46. 40	- 13. 51
15V	128. 908	51. 10	1. 45	12. 31	35. 70	29. 16	43. 50	- 14. 34
16V	141. 772	54. 70	1. 61	11. 78	35. 70	32. 39	43. 50	- 11. 11
17V	322. 169	48. 50	2. 69	15. 08	35. 31	30. 97	46. 40	- 15. 43
18V	335. 014	44. 80	2. 74	14. 74	35. 26	27. 03	46. 40	- 19. 37



**COMPATIBLE
ELECTRONICS**

Test Location : Compatible Electronics Page : 1/1
Customer : AVID INC Date : 10/09/2001
Manufacturer : AVID INC. Time : 11: 32: 39
Eut name : Mini Tracker II Lab : A
Model : ISO-FDXB Read Test Distance : 10
Serial # : A048977
Specification : FCC Class A
Distance correction factor (20 * log(test/spec)) : 0.00
Test Mode :

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor' d rdg = R dBuV	Li mit = L dBuV/m	Delta R-L dB
1H	51. 600	46. 60	0. 92	10. 90	35. 88	22. 53	39. 10	- 16. 57
2H	64. 469	49. 00	1. 00	9. 50	35. 75	23. 75	39. 10	- 15. 35
3H	77. 359	60. 30	1. 07	6. 70	35. 70	32. 38	39. 10	- 6. 72
4H	90. 248	55. 40	1. 30	9. 07	35. 51	30. 26	43. 50	- 13. 24
5H	115. 990	58. 40	1. 40	13. 05	35. 70	37. 15	43. 50	- 6. 35
6H	128. 899	57. 50	1. 45	12. 31	35. 70	35. 56	43. 50	- 7. 94
7H	154. 671	63. 40	1. 72	12. 27	35. 70	41. 69	43. 50	- 1. 81
8H	154. 6750Qp	63. 13	1. 72	12. 27	35. 70	41. 42	43. 50	- 2. 08
9H	167. 560	60. 90	1. 77	13. 88	35. 70	40. 85	43. 50	- 2. 65
10H	167. 569Qp	60. 65	1. 77	13. 88	35. 70	40. 60	43. 50	- 2. 90
11H	180. 421	54. 20	1. 85	16. 10	35. 68	36. 47	43. 50	- 7. 03
12H	193. 299	56. 70	1. 95	16. 10	35. 63	39. 12	43. 50	- 4. 38
13H	206. 193	54. 50	2. 05	16. 03	35. 57	37. 01	43. 50	- 6. 49
14H	219. 057	55. 20	2. 15	15. 90	35. 52	37. 73	46. 40	- 8. 67
15H	231. 974	53. 40	2. 23	15. 77	35. 50	35. 90	46. 40	- 10. 50
16H	270. 629	51. 50	2. 38	16. 90	35. 50	35. 29	46. 40	- 11. 11
17H	322. 161	52. 30	2. 69	15. 08	35. 31	34. 77	46. 40	- 11. 63
18H	335. 007	49. 60	2. 74	14. 74	35. 26	31. 83	46. 40	- 14. 57
19H	373. 704	50. 40	3. 00	13. 79	35. 15	32. 04	46. 40	- 14. 36