Test Report No.8412305156

For Medic4All (Israel) Ltd.

Equipment Under Test:

MiniGate

Model: *VMG03 (915 MHz)*

From The Standards Institution
Of Israel
Industry Division
Telematics Laboratory
EMC Section

ACCREDITED

Certificate No. 1487-01

42 Chaim Levanon St. Tel-Aviv 69977 Tel: 972-3-646-7800 Fax: 972-3-646-7779 www.sii.org.il

Test Report No.: 8412305156 **Page 1 of 29 Pages**

Title: Test on MiniGate **Model: VMG03 (915 MHz)**

Order placed by:	Medic4All (Israel) Ltd.
Address:	10 Hamefalsim Str., P.O. Box 4222, Petach-Tikva 49000, Israel
Sample for test selected by:	The customer
The date of test:	20/04, 12/05, 23/05/2004

Description of Equipment Under Test (EUT):	MiniGate
Model:	VMG03 (915 MHz)
Manufactured by:	Medic4All (Israel) Ltd.

Reference Documents:

- CFR 47 FCC: Rules and Regulations; Part 15. "Radio frequency devices";

  Subpart B. "Unintentional Radiators".

  Section 15.107. "Conducted limits".

  Section 15.109. "Radiated emission limits".

  Subpart C: "Intentional radiators" (2002),

  Section 15.205. "Restricted bands of operations",

  Section 15.207. "Conducted limits".

  Section 15.209. "Radiated emission limits, general requirements".

  "Radiated Emission Limits, Additional Provisions";
  Section 15.249. "Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz".

Test Results: The EUT meets the following requirements of CFR 47 FCC Part 15:

Subpart B Section 15.107. Conducted emission Class B,
Section 15.109. Radiated emission Class B.

Subpart C Section 15.207. Conducted Emission
Section 15.209. Radiated emission
Section 15.429 (a),
Section 15.205.

This Test Report contains 29 pages and may be used only in full.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.

Table of Contents

1. EUT Description and operation

1.1. General description:

* Note: All information in below clause was supplied by the customer.

Description of Equipment Under Test (EUT): MiniGate
Model: VMG03 (915 MHz)
Manufactured by: Medic4All (Israel) Ltd.

The VMG03 is MiniGate connects to the PC via USB interface and communicates with all Tested model has carrier frequency 915 MHz.
The EUT was tested together with a Cradle mfr Medic4All Model MiniGW-Cradle.

The EUT is Transceiver based on chipset Chipcon CC1020.
The transceiver uses one channel.
Integrated antenna – printed circuit board (PCB).

Output transmission power: -1 dBm (EIRP)
Bandwidth: 50 kHz
Modulation type: FSK.

The EUT"s dimensions: 9 cm x 2.5 cm x 1.5 cm.

The EUT's powered via USB cable from PC's USB slot 5V.
The current consumption of the VMG03 is up to 100 mA.

The EUT's block diagram and Tx/Rx block diagram are shown in Figures 1 and 2, respectively.
VMG03 external and internal views are presented in Photos 1-2.

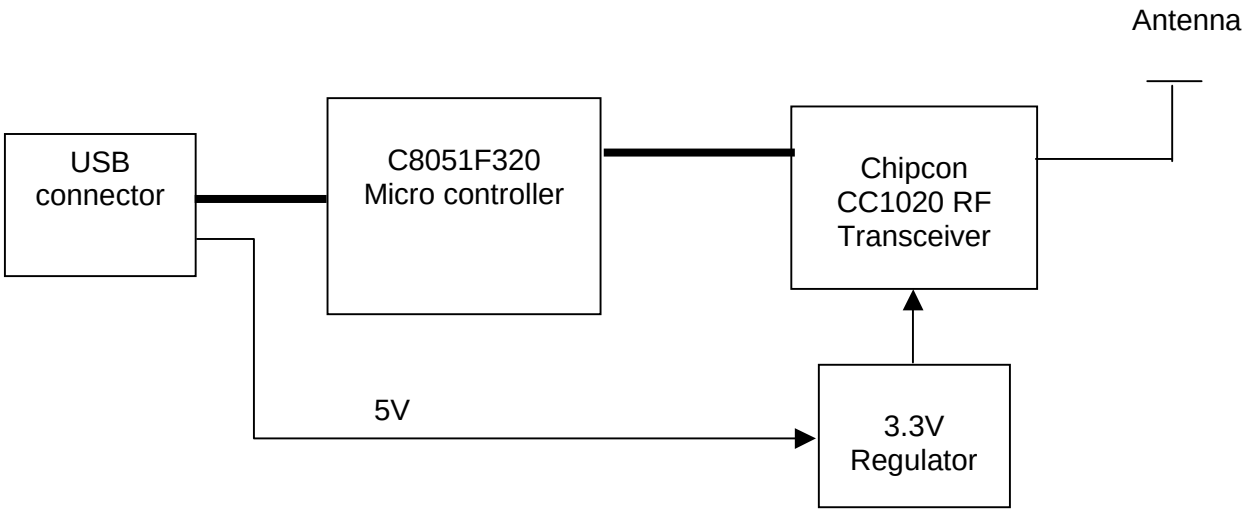


Figure 1. EUT's block diagram

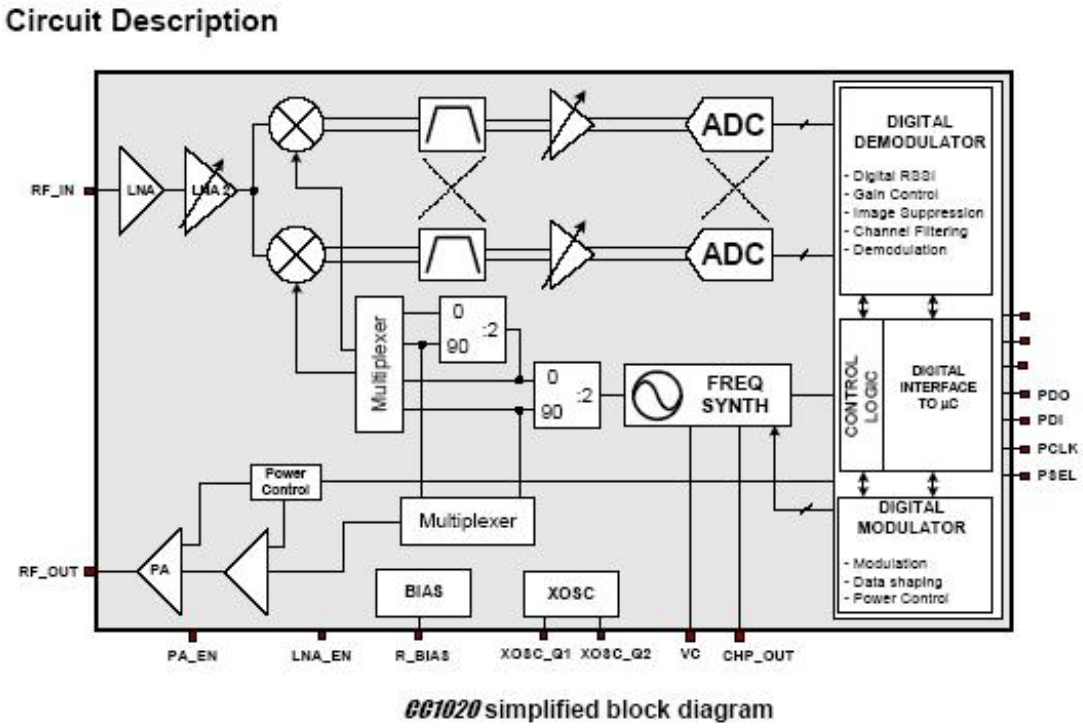
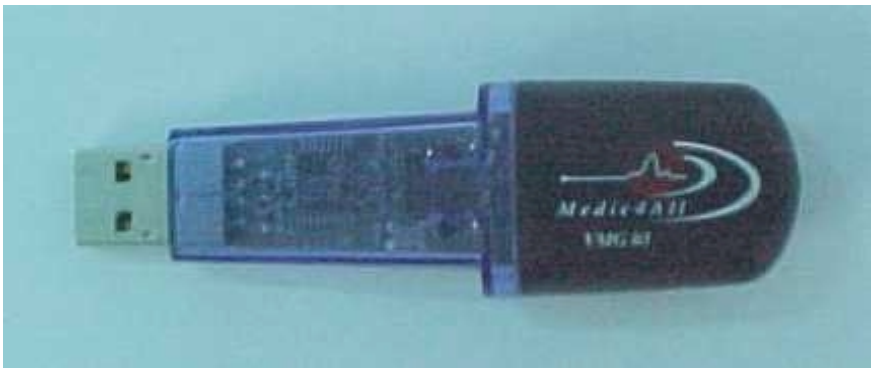


Figure 2. Tx-Rx block diagram

Photo 1. EUT's overall view



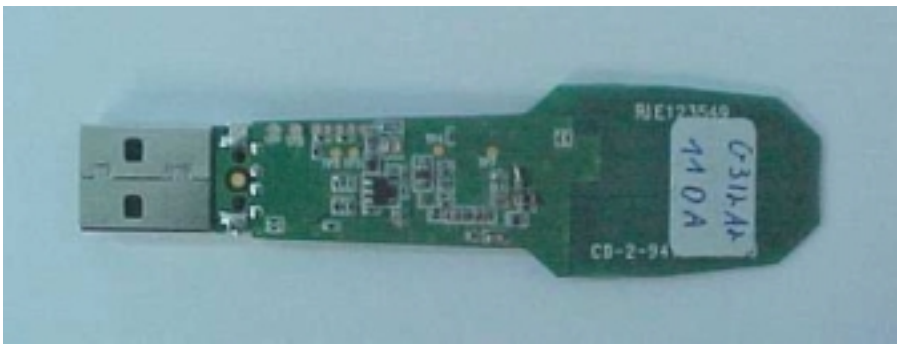


Photo 2. EUT's views from both sides

* Information in clauses below is provided by the manufacturer.

1.2. Potential emission sources:

The potential emission sources are detailed in Table 1.

Table 1. Potential emission sources

Frequency (MHz)	Location
14.7456 kHz crystal	VMG03
915 MHz RF signal	VMG03

1.3. Auxiliary equipment used:

Laptop IBM ThinkPad Type 2645 with a mouse and Printer mfr Olivetty were used as auxiliary equipment.

1.4. EUT setup and operation:

The EUT was placed on a Cradle. Cradle was connected to the PC via USB cable (shielded, length = 1 m), as described in Figure 3.

Respective tests were performed in Transmission (Tx) and Receiving (Rx) modes.

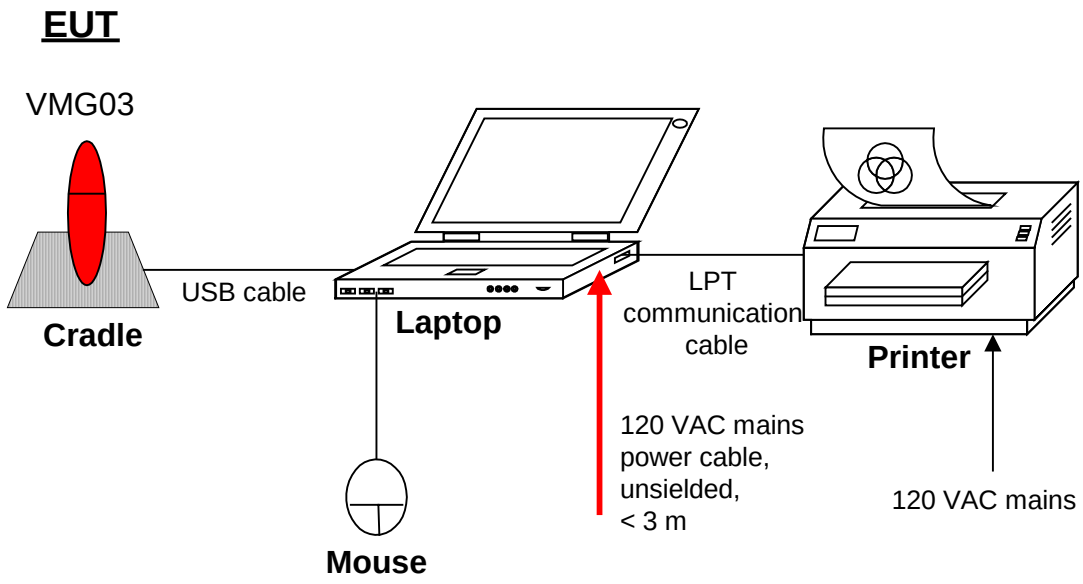


Figure 3. EUT's test setup

2. Measurements, examinations and derived results

2.1. Location of the Test Site:

Conducted emission tests and preliminary radiated test and immunity tests were conducted at the EMC laboratory of the Standards Institution of Israel in Tel-Aviv.

All other tests were conducted in an Open Area Test Site located at Kibbutz Native Halamed Hai in Emek HaEla, Israel.

2.2. Test condition:

Temperature: 22 °C. Humidity: 56 %. Atmospheric pressure: 1010 mbar.

2.3. Initial visual check and functional test:

Initial visual check and brief built- in- test of the EUT was performed before testing.

- No external damages were found. The test on the EUT passed successfully.

2.4. Emission tests:

- For both radiated and conducted measurements, initial scans were made using a peak detector but still using the appropriate CISPR 16 (Quasi-Peak) detector IF bandwidth.
- For conducted emissions, a tolerance limit was set 6 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector or an average detector.
- For radiated emissions, a tolerance limit was set 10 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector.
- Unless otherwise stated, the plots shown in Clause 2.5.4 are all from scans where a peak detector was used.
- If the result with a Quasi-Peak detector exceeds the specification limit, it is marked with “Fails” in the margin, if it is within the limits of uncertainty for the measurement, it is marked with a “*”.

2.5. Conducted emission test:

2.5.1. General:

Per FCC Part 15 Subpart B Section 15.107 / Subpart C Section 15.207.

2.5.2. Test Configuration:

The EUT was installed into the cradle.

The EUT was arranged a non-metallic table in a shielded chamber at a height of 80 cm from the floor of the shielded chamber and 40 cm from the vertical ground plane of the tested chamber.

2.5.3. Test Procedure:

The EUT was operated according to clause 1.4.

First, initial scan were performed. Final measurements were performed for emission, which exceeded the tolerance limit.

Test equipment (EMI receiver) setup was as follow:

Initial scan:	
Detector type	Peak
Mode	Max hold
Bandwidth	9 kHz
Step size	Continuous sweep
Sweep time	>100 msec

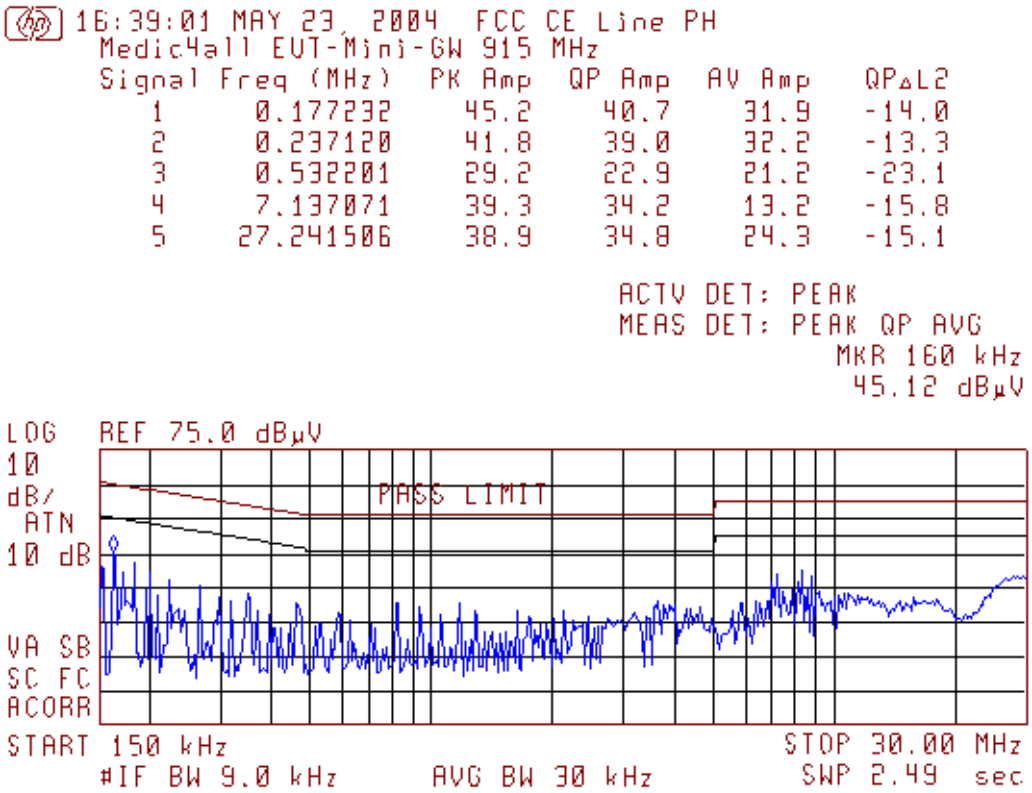
Measurements:	
Detector type	Quasi-peak (CISPR)
Bandwidth	9 kHz
Measurement time	200 seconds/MHz
Observation	>15 seconds

2.5.4. Test results:

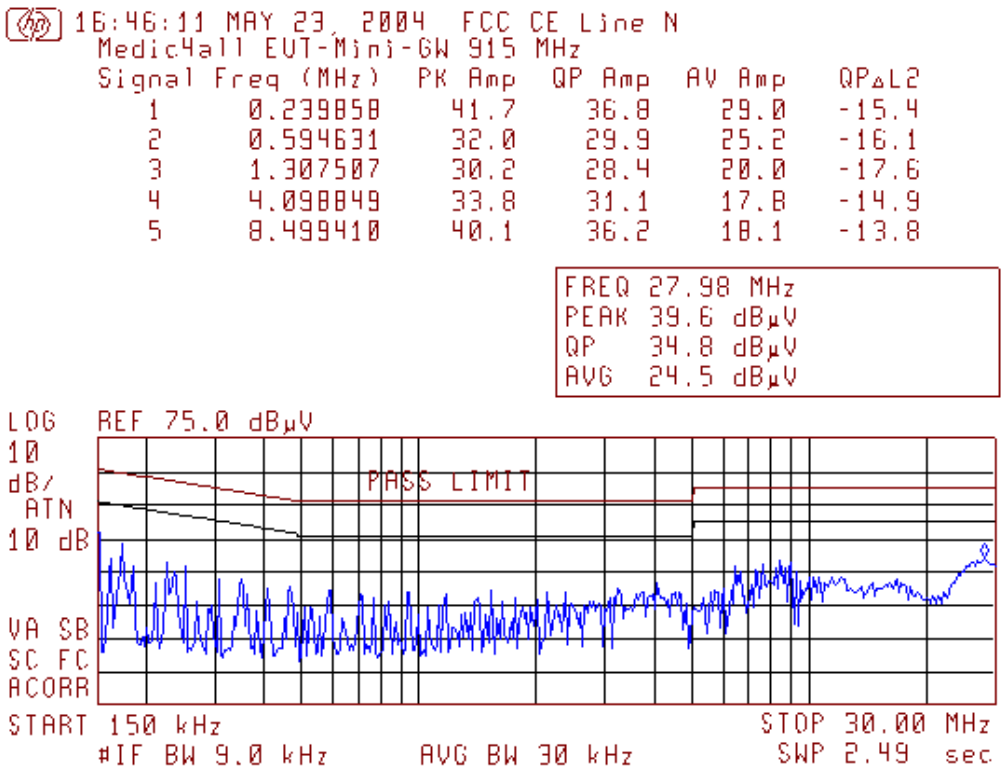
All received emissions from EUT were found below respective FCC limits.

Worst result recorded on Phase line at 0.24 MHz with QP detector was found to 13.3 dB below FCC Subpart B Section 15.107 Class B AVG limit / Subpart C Section 15.207 AVG limit.

Test results and plots are presented below.



Plot # 1.
Scan of conducted emission on 120 VAC mains
Specified limits: FCC Part 15
Subpart B Section 15.107 Class B /
Subpart C Section 15.207
Tested line: Phase, Neutral Peak detectors



Plot # 2.
Scan of conducted emission on 120 VAC mains
Specified limits: FCC Part 15
Subpart B Section 15.107 Class B /
Subpart C Section 15.207
Tested line: Neutral, Peak detectors

2.6. Radiated emission test:

2.7. General:

Per FCC Part 15 Subpart B Section 15.109 / Subpart C Section 15.209.

2.7.1. Preliminary radiated emission tests:

Preliminary radiated measurements were performed in a semi-anechoic chamber at a distance of 3 meters. The EUT was setup in its typical configuration and operated in Rx mode.

The frequency spectrum was monitored. EUT configuration, cable configuration and mode of operation, which produced the maximum level of emission, were documented. A list of frequencies to be tested was prepared.

2.7.2. Final measurements:

The final radiated measurements were performed at the Open Area Test Site.
The EUT was operated as described in clause 1.4.

The EUT was installed on a turn- table. Photos of test setup are presented Appendix 3.

All measurements at the Open Area Test Site were performed at a 10 m measurement distance. The Biconilog 30 MHz-2 GHz antenna was used.

The EUT's configuration and mode of operation, which produced the maximum level of emissions, were selected.

The Frequency range from 30 to 1000 MHz was investigated.
The measurements were performed at each frequency found previously and at frequencies at which the signal was 10 dB below the limit or less.

All measurements at the Open Area Test Site were performed at a 10 m measurement distance from the EUT.

The levels were maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna-to-EUT polarization from vertical to horizontal.

Unless stated otherwise, the measuring equipment settings were:

Initial scan:		**Measurements:**	
Detector type	Peak	Detector type	Quasi-peak (CISPR)
Mode	Max hold	Bandwidth	120 kHz
Bandwidth	120 kHz	Measurement time	20 seconds/MHz
Step size	Continuous sweep	Observation	>15 seconds
Sweep time	>1 seconds/MHz		

2.7.3. Radiated emission test results:

Test results are presented in Table 2.

Table 2. Radiated emission test results
Specified limits: FCC Part 15
Subpart B Section 15.109 Class B /
Subpart C Section 15.209

Frequency (MHz)	Turn-table Angle (°)	Antenna Polariz.	Antenna Height (m)	Emission Level (see Note 2) (dBμV/m)	Limit @ 10 m (dBμV/m)	Margin (dB)	Results
32.4	143	V	1.20	26.7	40.0	13.3	Complies
118.6	82	V	1.20	29.6	43.5	13.9	Complies
232.4	172	V	1.20	33.0	46.0	13.0	Complies
500.7	167	H	1.20	38.9	46.0	7.1	Complies
625.4	228	H	1.70	38.4	46.0	7.6	Complies
676.7	174	H	1.27	37.7	46.0	8.3	Complies

Note 1: Emission level = E Reading (dBμV) + Cable loss (dB) + Antenna Factor (dB/m)
For Cable Loss and Antenna Factor refer to Appendix 2

Note 2: The measurements were performed at 10 m distance and the results were extrapolated to 3 m distance.

2.8. Test of field strength of emission from intentional radiators

2.8.1. General:

Per FCC Part 15 Subpart C Clauses 15.249 (a) and 15.205.

2.8.2. Requirements:

The EUT's operation frequency is within the bands 902 – 928 MHz.
The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limits that presented in table below:
.

Fundamental Frequency	Limit of Field Strength of Fundamental (millivolts/ meter)	Calculated limit Field Strength of Fundamental dBμV/m, @ 3 m	Limit of Field Strength of Harmonics (microvolts/ meter)	Calculated limit Field Strength of Harmonics dBμV/m, @3 m
902 – 928 MHz	50	94	500	54

Note: Peak field strength of Harmonics not exceed the maximum permitted AVG specified limit above by more than 20 dB.

2.8.3. Test procedure:

The test was conducted according to clause 15.249 (a).
The measurements were conducted at the normal conditions.
The Fundamental frequency was recorded (see Plot # 3).

The measurements (spurious emission) were performed in Tx mode in the frequency rage from 30 MHz to 6500 MHz (with detector QP – below 1000 MHz and AVG detector – above 1000 MHz).

Test of range of modulation bandwidth (20 dB) was performed for information only (see Plot # 8).

2.8.4. Test results:

Recorded Fundamental frequency was 90.68 dBμV/m (see Plot # 3).
The result was found below specified limit.

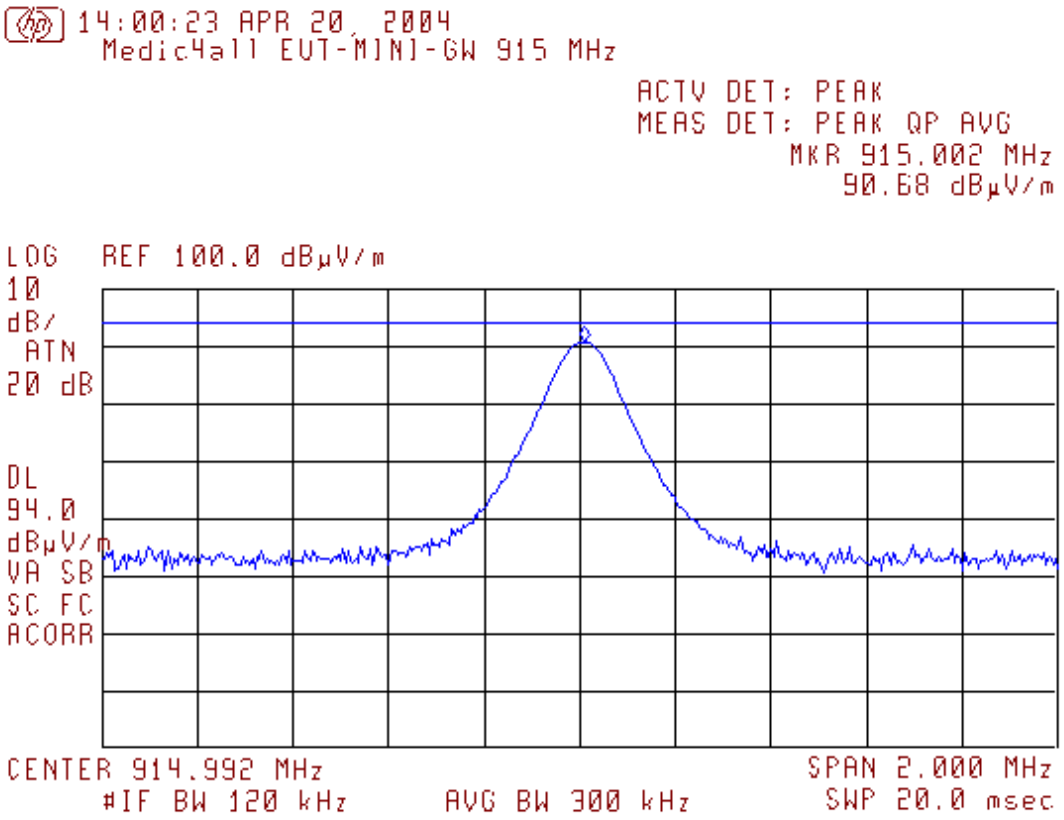
Spurious emission test results are shown in table below (worst case results were recorded) and in Plots #4-#6.

Frequency MHz	AVG Ampl. dBμV/m	AVG limit, dBμV/m	Margin, dB	Reference Plot
1829.98	46.4	54.0	7.6	Plot # 6
2744.92	41.3	54.0 *	12.7	Plot # 6

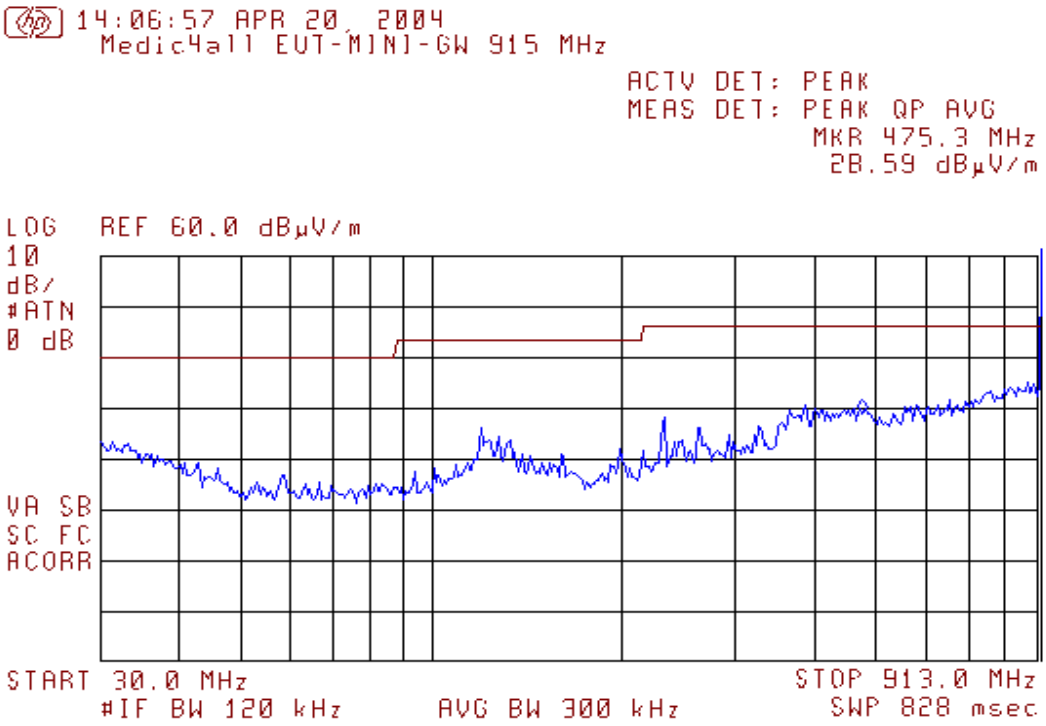
* Limit specified per FCC Subpart C Section 15.205: “Restricted bands of operation”.

2.8.5. Test summery:

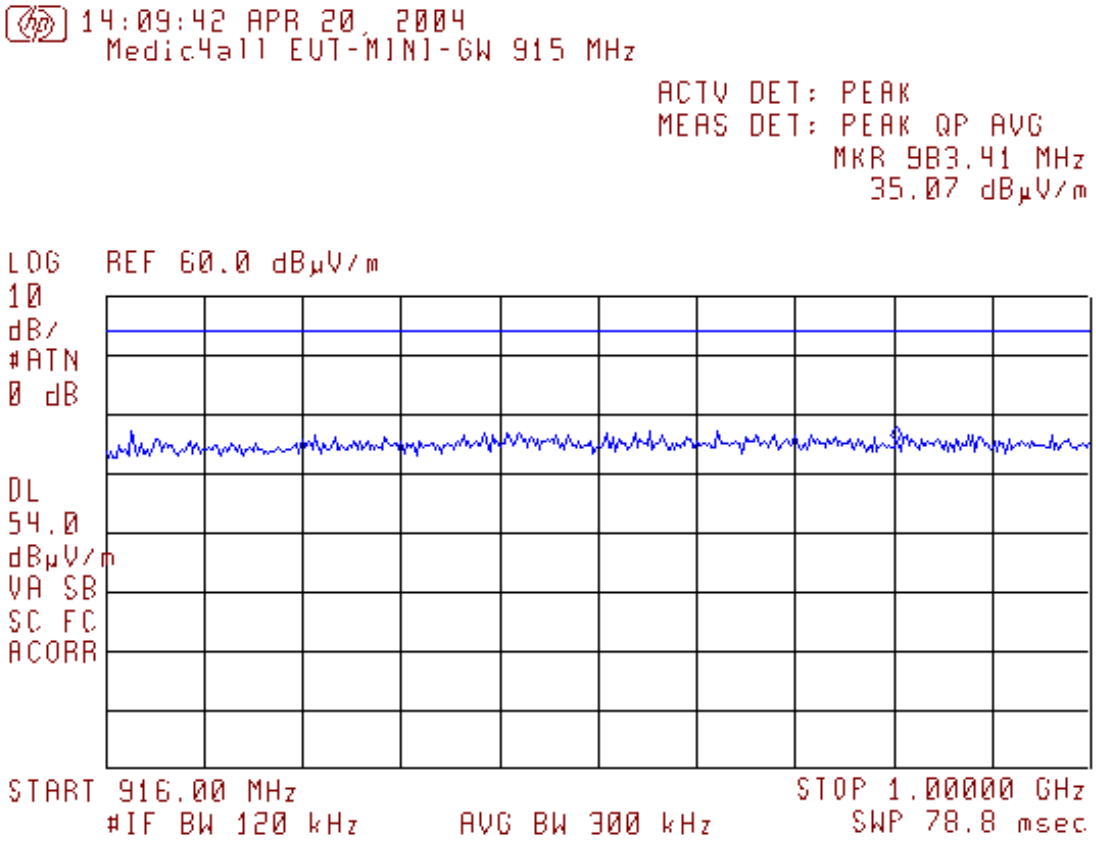
The tested unit meets the standard requirement.



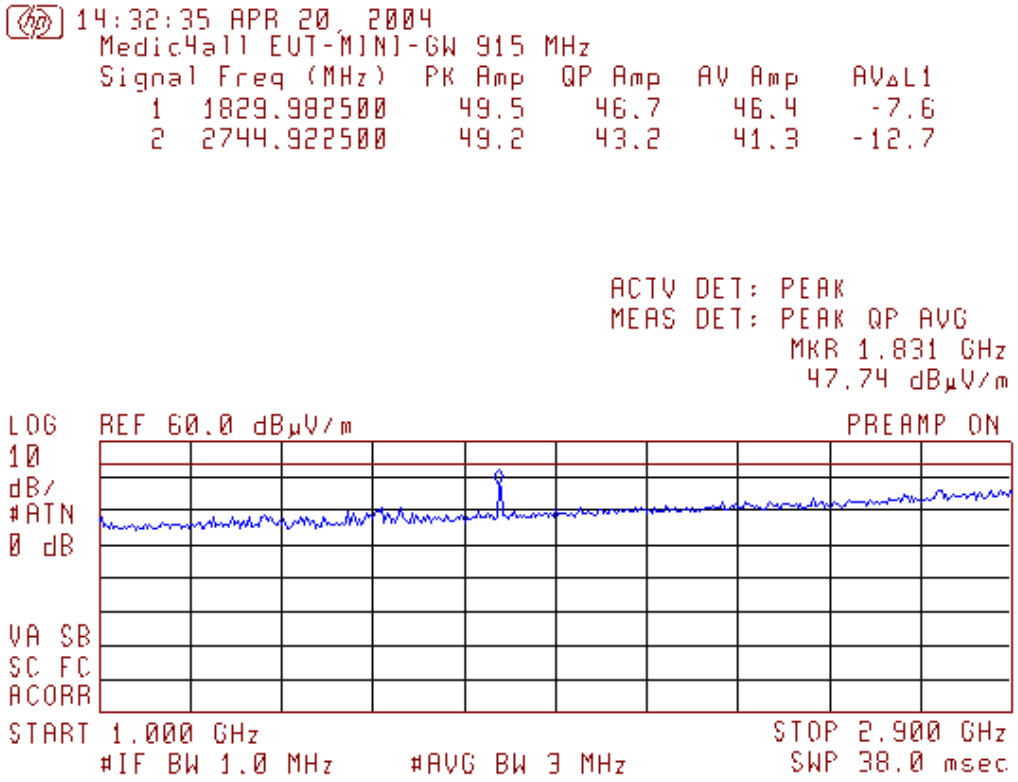
Plot # 3. Scan of Fundamental frequency



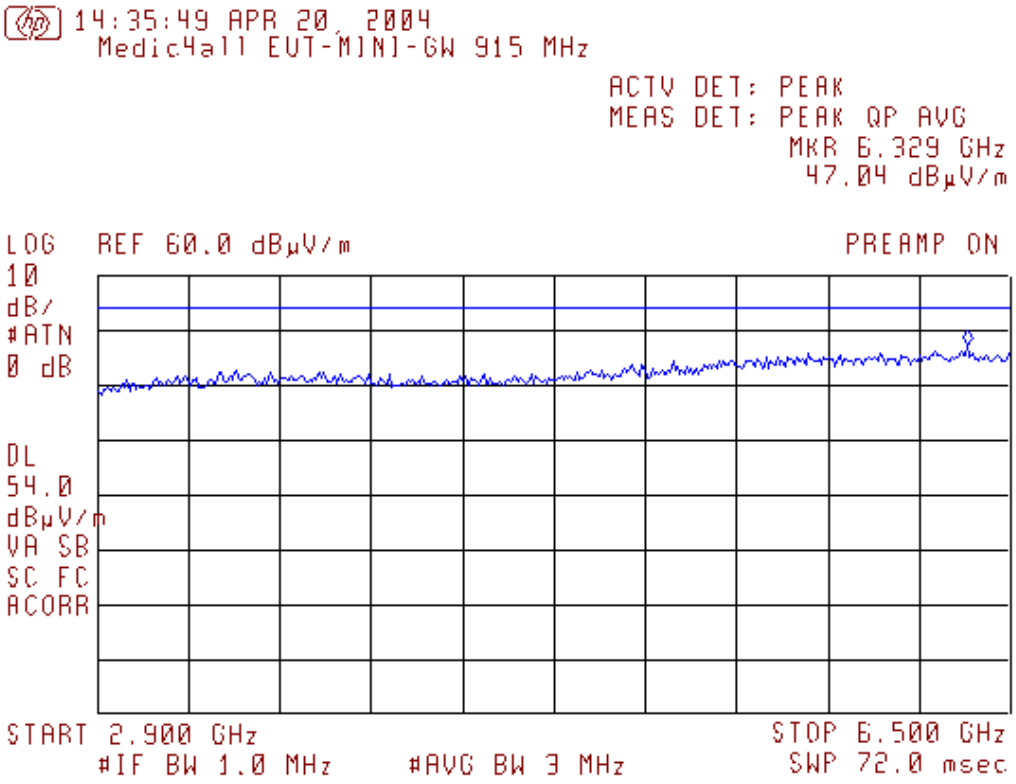
Plot # 4. Tx mode. Spurious emissions
Frequency range from 30.0 MHz to 913.0 MHz



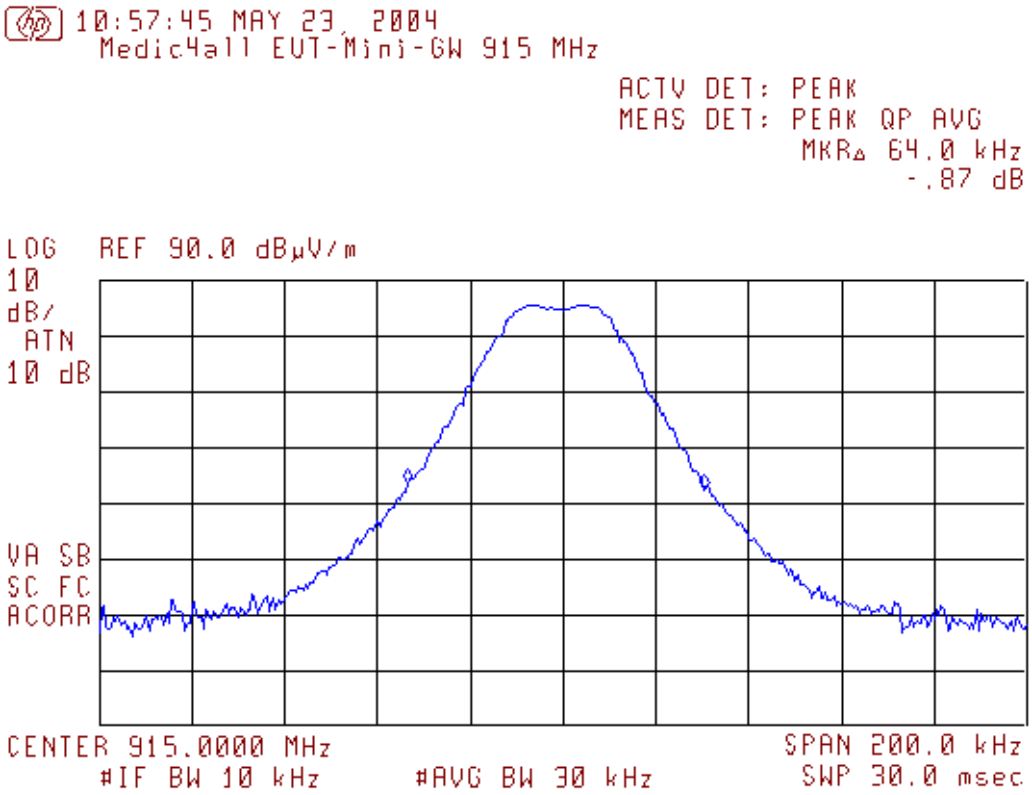
Plot # 5. Tx mode. Spurious emissions
Frequency range from 916.0 MHz to 1000 MHz



Plot # 6. Tx mode. Spurious emissions
Frequency range from 1000 MHz to 2900 MHz



Plot # 7. Tx mode. Spurious emissions
Frequency range from 2900 MHz to 6500 MHz



Plot # 8. Range of modulation bandwidth
(for information only)

3. Test summary

Parameter	FCC Part 15 Reference paragraph	Comply/not comply with the requirements
Conducted emission Freq. range of 150 kHz to 30 MHz	Subpart B Section 15.107 Class B	Comply
	Subpart C Section 15.207	Comply
Radiated emission Frequencies range of 30 -1000 MHz	Subpart B Section 15.109 Class B	Comply
	Subpart C Section 15.209	Comply
Test of field strength of emission from intentional radiators	"Radiated Emission Limits, Additional Provisions"; Section 15.249(a).	Comply
Test of field strength of emission from intentional radiators, restricted bands	Subpart C Section 15.205	Comply

Telematics Laboratory

22 July 2004

Name: Eng. Yuri Rozenberg
Position: Head of EMC Branch

Name: Michael Feldman
Position: Test Technician

Written by: Rotenfeld Mariya

Position: Technical Writer

4. Appendix 1. Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding one year.

FCC Part 15 Subpart B Section / Subpart C Section 15.209

Instrument	MFR	Model	Serial No.	Last calibration date	Next calibration date
EMI Receiver	HP	8546A+85460A	SII 4068	11/03	11/04
LISN 9 kHz – 30 MHz	FCC	LISN-50/250-32-4-16	SII 5023	05/04	05/05
Transient limiter 0.009-200 MHz	HP	11947A	31074A3105	05/04	05/05
Antenna Biconilog 30 – 2000 MHz	Schaffner-Chase	CBL6112B	S/N 2531	12/03	12/04
Antenna Mast	R&S	HCM	100002	N/A	N/A
Metallic turntable	R&S	HCT12	100001	N/A	N/A
Positioning controller	R&S	HCC	100002	N/A	N/A

FCC Part 15 Subpart C Sections 15.249 and 15.205

Instrument	MFR	Model	Serial No.	Last calibration date	Next calibration date
EMI Receiver 10 kHz - 26.5 GHz	HP	E7405A	SII 4944	01/04	01/05
Antenna Bilog 30-2000 MHz	Schaffner-Chase	CBL6112B	SII5119	10/03	10/04
Antenna Double Ridge, 1-18 GHz	EMCO	3115	SII4873	10/03	10/04

5. Appendix 2: Antenna Factor and Cable Loss

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.201	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84

Table 3. Antenna Factor

For Biconilog Antenna, Model Number: CBL-6112B, S/N: 2531
10 m Calibration

Horizontal Polarization				Vertical Polarization			
Frequency (MHz)	Antenna Factor (dB/m)	Frequency (MHz)	Antenna Factor (dB/m	Frequency (MHz)	Antenna Factor (dB/m)	Frequency (MHz)	Antenna Factor (dB/m)
30	19.7	725	19.7	30	17.6	725	19.8
40	13.8	750	20.1	40	16.1	750	20.0
50	8.5	775	20.1	50	8.2	775	20.0
60	6.3	800	20.1	60	6.0	800	20.1
70	6.4	825	20.3	70	6.2	825	20.3
80	7.2	850	20.5	80	7.7	850	20.6
90	9.1	875	20.7	90	9.2	875	20.8
100	10.8	900	20.7	100	10.6	900	20.9
110	11.7	925	20.9	110	11.4	925	21.0
120	12.0	950	21.0	120	11.7	950	21.2
130	11.8	975	21.4	130	11.8	975	21.3
140	11.3	1000	21.5	140	11.3	1000	21.4
150	10.5	1050	22.0	150	10.4	1050	21.9
160	10.0	1100	22.2	160	9.8	1100	22.2
170	9.6	1150	22.7	170	9.4	1150	22.6
180	9.2	1200	23.2	180	9.4	1200	23.1
190	9.0	1250	23.6	190	9.6	1250	23.5
200	9.3	1300	24.0	200	9.9	1300	23.8
225	9.8	1350	24.1	225	10.5	1350	24.0
250	12.7	1400	24.6	250	12.6	1400	24.3
275	12.9	1450	24.9	275	13.2	1450	24.7
300	13.3	1500	25.1	300	13.4	1500	25.0
325	13.8	1550	25.2	325	13.8	1550	25.2
350	14.6	1600	25.4	350	14.6	1600	25.3
375	15.0	1650	25.9	375	15.1	1650	25.8
400	15.9	1700	26.1	400	16.0	1700	26.0
425	16.6	1750	26.4	425	16.7	1750	26.2
450	16.8	1800	26.4	450	16.7	1800	26.4
475	17.5	1850	26.7	475	17.4	1850	26.7
500	17.7	1900	27.3	500	17.7	1900	27.3
525	18.0	1950	27.6	525	18.0	1950	27.3
550	19.3	2000	27.6	550	19.1	2000	27.7
575	19.4			575	19.1		
600	19.3			600	19.3		
625	19.7			625	19.5		
650	19.6			650	19.5		
675	19.5			675	19.5		
700	19.4			700	19.5		

Gain and Antenna Factor for Double Ridged Guide Antenna

Model Number: 3115, S/N 5802, manufactured by EMC Test Systems

1.0 meter calibration, Polarization: Horizontal, Calibrated on 30/Dec/03

Frequency (MHz)	Antenna Factor (dB/m)	Gain Numeric	Gain (dBi)
1,000.00	24.30	3.90	5.91
1,500.00	25.50	6.65	8.23
2,000.00	27.77	7.01	8.46
2,500.00	28.83	8.59	9.34
3,000.00	30.68	8.08	9.07
3,500.00	31.84	8.41	9.25
4,000.00	33.14	8.14	9.11
4,500.00	32.61	11.66	10.67
5,000.00	34.17	10.04	10.02
5,500.00	34.63	10.92	10.38
6,000.00	35.15	11.54	10.62
6,500.00	35.14	13.59	11.33
7,000.00	35.86	13.34	11.25
7,500.00	37.21	11.22	10.50
8,000.00	37.64	11.57	10.63
8,500.00	38.18	11.52	10.62
9,000.00	38.17	12.96	11.13
9,500.00	38.37	13.77	11.39
10,000.00	38.73	14.05	11.48
10,500.00	38.79	15.30	11.85
11,000.00	38.98	16.06	12.06
11,500.00	39.77	14.63	11.65
12,000.00	39.58	16.64	12.21
12,500.00	39.51	18.36	12.64
13,000.00	40.87	14.50	11.61
13,500.00	41.46	13.65	11.35
14,000.00	42.04	12.85	11.09
14,500.00	41.42	15.90	12.01
15,000.00	39.78	24.84	13.95
15,500.00	38.55	35.25	15.47
16,000.00	38.90	34.65	15.40
16,500.00	39.84	29.65	14.72
17,000.00	42.09	18.76	12.73
17,500.00	45.12	9.89	9.95
18,000.00	46.90	6.94	8.42

Gain and Antenna Factor for Double Ridged Guide Antenna

Model Number: 3115, S/N 5802, manufactured by EMC Test Systems
1.0 meter calibration, Polarization: Vertical, Calibrated on 30/Dec/03

Frequency (MHz)	Antenna Factor (dB/m)	Gain Numeric	Gain (dBi)
1,000.00	24.08	4.10	6.13
1,500.00	25.63	6.46	8.10
2,000.00	27.88	6.85	8.35
2,500.00	29.01	8.23	9.15
3,000.00	30.65	8.12	9.10
3,500.00	32.01	8.09	9.08
4,000.00	33.07	8.28	9.18
4,500.00	32.81	11.14	10.47
5,000.00	34.09	10.22	10.10
5,500.00	34.84	10.43	10.18
6,000.00	34.97	12.02	10.80
6,500.00	35.34	12.98	11.13
7,000.00	36.33	11.98	10.78
7,500.00	37.54	10.41	10.17
8,000.00	37.82	11.11	10.46
8,500.00	38.28	11.28	10.52
9,000.00	38.33	12.48	10.96
9,500.00	38.55	13.22	11.21
10,000.00	38.76	13.98	11.45
10,500.00	38.65	15.79	11.98
11,000.00	39.06	15.76	11.97
11,500.00	39.63	15.10	11.79
12,000.00	39.52	16.87	12.27
12,500.00	39.57	18.09	12.57
13,000.00	40.80	14.74	11.69
13,500.00	41.76	12.77	11.06
14,000.00	42.10	12.67	11.03
14,500.00	41.49	15.66	11.95
15,000.00	40.02	23.49	13.71
15,500.00	38.40	36.41	15.61
16,000.00	38.23	40.40	16.06
16,500.00	39.71	30.55	14.85
17,000.00	41.86	19.75	12.96
17,500.00	44.89	10.42	10.18
18,000.00	46.26	8.05	9.06

6. Appendix 3: Test configuration illustrations

This appendix contains the following illustrations:

Photo 3. Test setup on Open site. Front view

Photo 4. Test setup on Open site. Rear view