

PEAK OUTPUT POWER and RF EXPOSURE TEST REPORT (Attachment to test report VISRAD_FCC.17292)

ACCORDING TO: FCC CFR 47 Parts 22, 24; Part 2, section 2.1091; RSS-102

FOR:

Visonic Ltd.

Wireless Alarm Control System

**Model: PowerMax Pro with CDMA
module**

This report is in conformity with ISO/ IEC 17025. The A2LA logo endorsement applies only to the test methods and the standards that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

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1 Applicant information

Client name: Visonic Ltd.
Address: 24 Habarzel street, Tel Aviv 61920, Israel
Telephone: +972 3645 6789
Fax: +972 3645 6788
E-mail: aelshtein@visonic.com
Contact name: Mr. Arick Elshtein

2 Equipment under test attributes

Product name: Wireless Alarm Control System
Product type: Transceiver
Model(s): PowerMax Pro with CDMA module
Receipt date 10/19/2006

3 Manufacturer information

Manufacturer name: Visonic Ltd.
Address: 24 Habarzel street, Tel Aviv 61920, Israel
Telephone: +972 3645 6789
Fax: +972 3645 6788
E-Mail: aelshtein@visonic.com
Contact name: Mr. Arick Elshtein

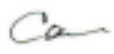
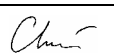
4 Test details

Project ID: 17407
Location: Hermon Laboratories Ltd. P.O.Box 23, Binyamina 30500, Israel
Test started: 10/19/2006
Test completed: 11/5/2006
Test specification(s): FCC 47 CFR parts 2, 22, 24:2005; RSS-102

5 Tests summary

Test	Status
FCC Sections 22.913, 24.232, RF output power	Pass
FCC Section 2.1091, RSS-102, RF radiation exposure evaluation	Pass

The results obtained indicate that the product under test complies with the requirements tested.
The test results relate only to the items tested. Pass / fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer	November 5, 2006	
	Mr. A.Lane, test engineer		
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	November 8, 2006	
Approved by:	Mr. M. Nikishin, EMC and radio group leader	November 9, 2006	

6 EUT description

6.1 General information

The EUT, PowermaxPro, is the controlling center of a wireless intrusion/burglar alarm system. The PowermaxPRO gets (is triggered by) alarms from various intrusion sensors via an RF link (315 MHz) and reports these intrusions locally and to remote control centers.

The PowermaxPRO has several states of alertness, such as "armed away", "armed home" and "disarmed", the reactions to each state differs and is explained in the manuals. Those various states are achieved in three ways, via the on board/ integrated keypad, via the RFID proximity sensor (125 kHz) and via the RF transmitter type MCT 234. The local reporting of the PowermaxPro is via its LCD display as well as various tones and internal sounder and prerecorded vocal alerts. The remote reporting of an intrusion is via an analogue telephone line or alternatively via CDMA modem through the cellular network to a central monitoring station. The CDMA module, model name Q2438, manufactured by Wavecom, operates in 824 – 849 MHz and 1850 – 1910 MHz frequency bands.

6.2 Ports and lines

Port type	Port description	Connected		Connector type	Qty.	Cable type	Cable length	Indoor / outdoor
		From	To					
Telecom	PSTN	EUT	Line simulator	RJ 11	1	Unshielded	3 m	Outdoor
Signal	Phone	EUT	Telephone set	RJ 11	1	Unshielded	3 m	Indoor
Signal	Antenna	EUT	Antenna	coax	1	coax	3.5 m	Indoor
USA version								
Power	AC mains	EUT	AC mains	Terminal block	1	Unshielded	2.5 m	Indoor
Canada version								
Power	12 VDC	EUT	Power supply	DC jack	1	Unshielded	2 m	Indoor
Power	AC mains	Power supply 2	AC mains	Terminal block	1	Unshielded	2 m	Indoor

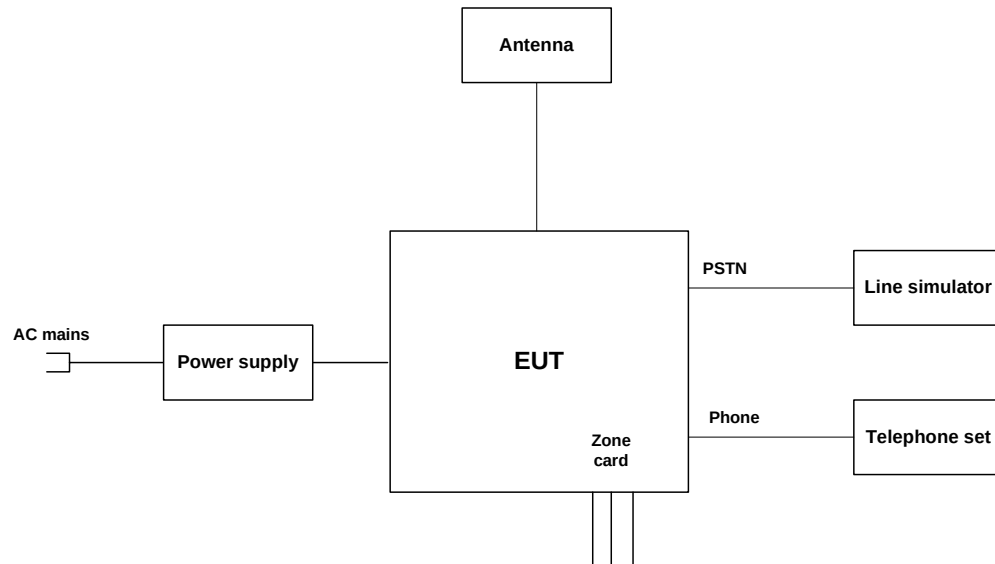
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Line simulator	Hermon Labs	LS-02	2556
Telephone	Casio	1015	1037050859
Power supply 1	Leader electronic Inc.	MU24-1125160-A1	NA
Power supply 2	Flying power supply	FY-0205 Rev1.A	NA
Zone card (used for USA version only)	Visonic	ME294V0 Pmax Pro Zones	NA

6.4 Operating frequencies

Source	Frequency, MHz					
Clock	4.19	16.0	NA	NA	NA	NA
Tx	315	NA	NA	NA	NA	NA
Rx	315	NA	NA	NA	NA	NA
Tx/Rx	0.128	NA	NA	NA	NA	NA

6.5 Test configuration



Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

7 Transmitter tests

7.1 Peak output power (radiated)

7.1.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Peak output power		Equivalent field strength limit @ 3m, dB(μV/m)*
	W	dBm	
824 – 849	7.0	38.45	133.68
1850 – 1910	2.0	33.00	128.23

*- Equivalent field strength limit was calculated from the peak output power as follows: $E = \sqrt{30 \times P \times G} / r$, where P is peak output power in Watts, r is antenna to EUT distance in meters and G is transmitter antenna gain in dBi.

7.1.2 Test procedure for field strength measurements

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.2.2 The EUT was adjusted to produce maximum available to end user RF output power.

7.1.2.3 The resolution bandwidth of spectrum analyzer was set wider than 6 dB bandwidth of the EUT and the field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360° and the measuring antenna height was swept in both vertical and horizontal polarizations.

7.1.2.4 The measurements were performed in 3 orthogonal positions of the EUT.

7.1.2.5 The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.1.2 and associated plots.

7.1.3 Test procedure for substitution power measurements

7.1.3.1 The test equipment was set up as shown in Figure 7.1.2 and energized.

7.1.3.2 RF signal generator was set to the EUT carrier frequency and the RF output level was preliminary adjusted to produce the same field strength as it was measured from the EUT.

7.1.3.3 The test antenna height was swept to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from the EUT.

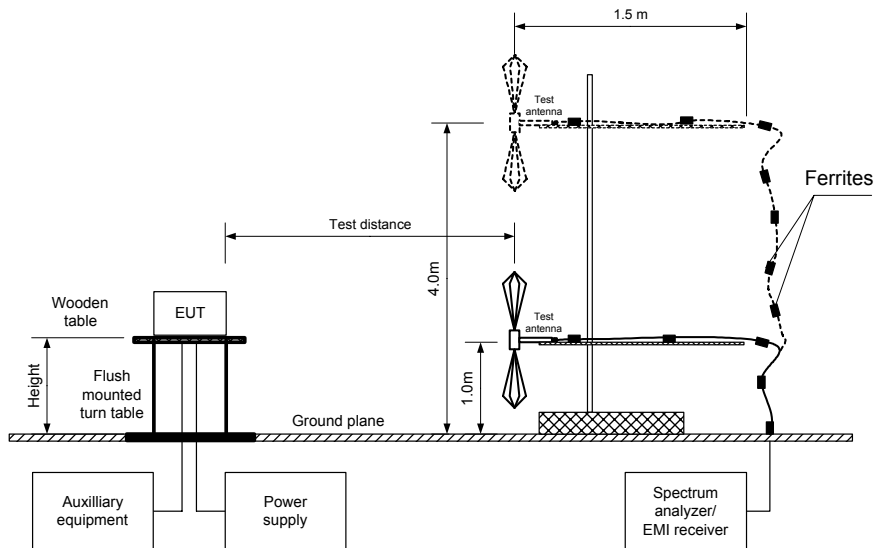
7.1.3.4 The maximum peak output power was calculated as a sum of signal generator output power in dBm and substitution antenna gain in dBi reduced by cable loss in dB.

7.1.3.5 The above procedure was performed in both horizontal and vertical polarizations of the substitution antenna.

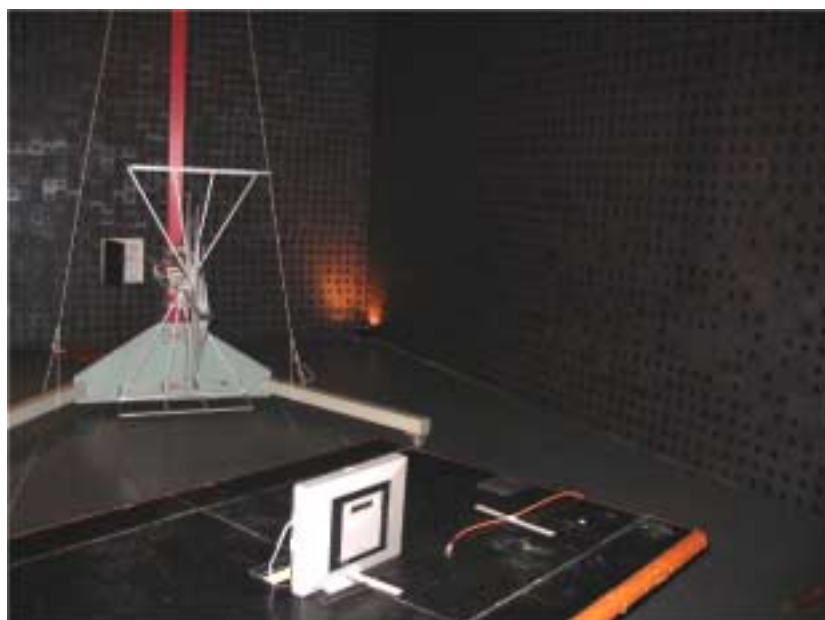
7.1.3.6 The worst test results (the lowest margins) were recorded in Table 7.2.3 and shown in the associated plots.

Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict: PASS	
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Figure 7.1.1 Setup for carrier field strength measurements

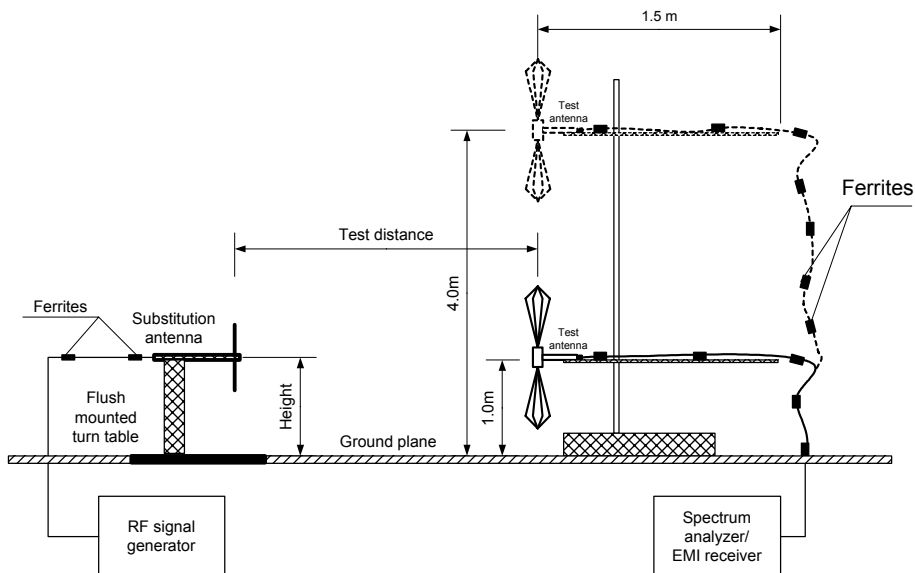


Photograph 7.1.1 Setup for carrier field strength measurements

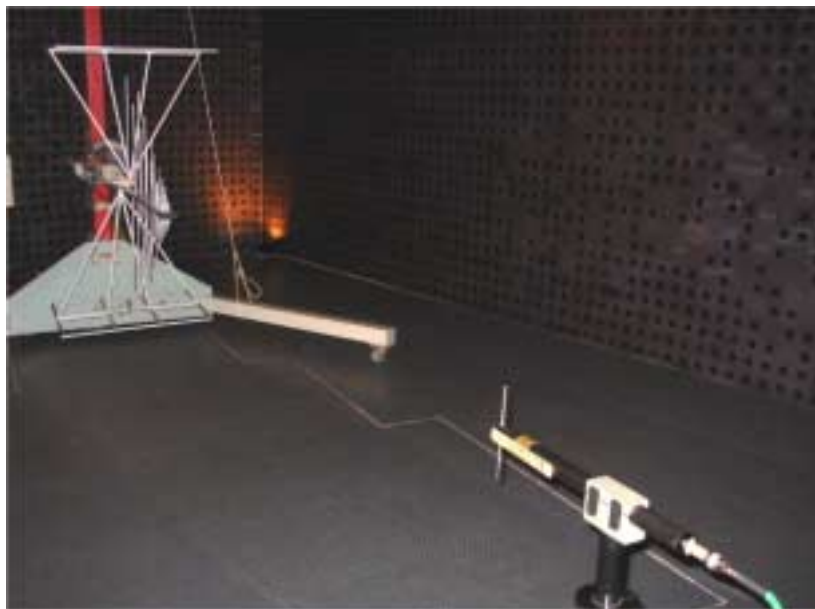


Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Figure 7.1.2 Setup for substitution peak output power measurements



Photograph 7.1.2 Setup for substitution peak output power measurements



Test specification: Section 22.913, Section 24.232, Peak output power			
Test procedure: FCC part 22, Section 22.913; part 24, Section 24.232			
Test mode: Compliance	Verdict: PASS		
Date: 11/5/2006			
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.2 Field strength measurement of peak output power

TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber
EUT HEIGHT: 0.8 m
EUT POSITION: Typical
DETECTOR USED: Peak
TEST ANTENNA TYPE: Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
MODULATION: DSSS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DETECTOR USED: Peak
OPERATING FREQUENCY RANGE: 824 - 849 MHz
ANTENNA TYPE: INTERNAL

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Antenna polarization	Antenna height, m	Turn-table position**, degrees	EUT position
825.55	124.18	133.68	-9.50	Vertical	1.0	263	Z-axis
825.45	123.21	133.68	-10.47	Horizontal	2.1	33	Z-axis
835.68	122.58	133.68	-11.10	Vertical	1.3	270	Z-axis
835.68	121.05	133.68	-12.63	Horizontal	2.1	35	Z-axis
847.60	122.39	133.68	-11.29	Vertical	1.0	266	Z-axis
847.55	119.74	133.68	-13.94	Horizontal	2.1	0	Z-axis

OPERATING FREQUENCY RANGE: 1850 - 1910 MHz

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Antenna polarization	Antenna height, m	Turn-table position**, degrees	EUT position
1852.15	119.91	128.23	-8.32	Vertical	1.25	266	Z-axis
1851.85	121.23	128.23	-7.00	Horizontal	1.33	343	Z-axis
1877.95	118.87	128.23	-9.36	Vertical	1.12	140	Z-axis
1877.49	123.49	128.23	-4.74	Horizontal	1.30	314	Z-axis
1908.85	120.06	128.23	-8.17	Vertical	1.26	275	Z-axis
1908.90	123.07	128.23	-5.16	Horizontal	1.25	322	Z-axis

*- Margin = Field strength – calculated field strength limit.

**-. EUT front panel refer to 0 degrees position of turntable.

Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.3 Field strength measurement of peak output power

TEST DISTANCE: 3 m
TEST SITE: Semi anechoic chamber
EUT HEIGHT: 0.8 m
EUT POSITION: Typical
DETECTOR USED: Peak
TEST ANTENNA TYPE: Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
MODULATION: DSSS
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DETECTOR USED: Peak
OPERATING FREQUENCY RANGE: 824 - 849 MHz
ANTENNA TYPE: EXTERNAL

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Antenna polarization	Antenna height, m	Turn-table position**, degrees	EUT position
825.55	120.41	133.68	-13.27	Vertical	1.0	316	825.55
825.20	119.99	133.68	-13.69	Horizontal	1.0	168	825.20
836.15	119.90	133.68	-13.78	Vertical	1.0	324	Z-axis
835.55	117.96	133.68	-15.72	Horizontal	1.0	164	Z-axis
847.65	120.59	133.68	-13.09	Vertical	1.0	320	Z-axis
847.65	117.17	133.68	-16.51	Horizontal	1.0	147	Z-axis

OPERATING FREQUENCY RANGE: 1850 - 1910 MHz

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Antenna polarization	Antenna height, m	Turn-table position**, degrees	EUT position
1851.45	118.13	128.23	-10.10	Vertical	1.10	194	Z-axis
1851.85	116.11	128.23	-12.12	Horizontal	1.31	161	Z-axis
1877.65	121.26	128.23	-6.97	Vertical	1.15	162	Z-axis
1877.45	115.58	128.23	-12.65	Horizontal	1.30	188	Z-axis
1908.55	119.89	128.23	-8.34	Vertical	1.20	177	Z-axis
1909.05	114.77	128.23	-13.46	Horizontal	1.30	9	Z-axis

Test specification:	Section 22.913, Section 24.232, Peak output power		
Test procedure:	FCC part 22, Section 22.913; part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.4 Substitution measurement of peak output power

TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
OPERATING FREQUENCY RANGE: 824 - 849 MHz
ANTENNA TYPE: INTERNAL

Frequency, MHz	Field strength, dB(μV/m)	Antenna polarization	RF generator output, dBm	Antenna gain, dBd	Cable loss, dB	Peak output power, ERP dBm	Limit, dBm	Margin, dB*	Verdict
825.55	124.18	Vertical	29.26	-0.50	1.64	27.13	38.45	-11.32	Pass
825.45	123.21	Horizontal	27.88	-0.50	1.64	25.75	38.45	-12.70	Pass
835.68	122.58	Vertical	27.91	-0.45	1.65	25.81	38.45	-12.64	Pass
835.68	121.05	Horizontal	25.94	-0.45	1.65	23.84	38.45	-14.61	Pass
847.60	122.39	Vertical	27.92	-0.40	1.66	25.86	38.45	-12.59	Pass
847.55	119.74	Horizontal	24.61	-0.40	1.66	22.55	38.45	-15.90	Pass

*- Margin = Peak output power – specification limit.

OPERATING FREQUENCY RANGE: 1850 - 1910 MHz

Frequency, MHz	Field strength, dB(μV/m)	Antenna polarization	RF generator output, dBm	Antenna gain, dBi	Cable loss, dB	Peak output power, EIRP dBm	Limit, dBm	Margin, dB*	Verdict
1852.15	119.91	Vertical	16.55	9.17	2.45	23.27	33.00	-9.73	Pass
1851.85	121.23	Horizontal	18.11	9.17	2.45	24.83	33.00	-8.17	Pass
1877.95	118.87	Vertical	15.33	9.19	2.47	22.05	33.00	-10.95	Pass
1877.49	123.49	Horizontal	19.93	9.19	2.47	26.65	33.00	-6.35	Pass
1908.85	120.06	Vertical	17.19	9.20	2.49	23.90	33.00	-9.10	Pass
1908.90	123.07	Horizontal	19.99	9.20	2.49	26.70	33.00	-6.30	Pass

Test specification:	Section 22.913, Section 24.232, Peak output power		
Test procedure:	FCC part 22, Section 22.913; part 24, Section 24.232		
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Table 7.1.5 Substitution measurement of peak output power

TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 0.8 m
DETECTOR USED: Peak
SUBSTITUTION ANTENNA TYPE: Tunable dipole (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
OPERATING FREQUENCY RANGE: 824 - 849 MHz
ANTENNA TYPE: EXTERNAL

Frequency, MHz	Field strength, dB(μV/m)	Antenna polarization	RF generator output, dBm	Antenna gain, dBd	Cable loss, dB	Peak output power, ERP dBm	Limit, dBm	Margin, dB*	Verdict
825.55	120.41	Vertical	25.49	-0.50	1.64	23.36	38.45	-15.09	Pass
825.20	119.99	Horizontal	24.66	-0.50	1.64	22.52	38.45	-15.93	Pass
836.15	119.90	Vertical	25.03	-0.44	1.65	22.94	38.45	-15.51	Pass
835.55	117.96	Horizontal	23.05	-0.45	1.65	20.95	38.45	-17.50	Pass
847.65	120.59	Vertical	25.72	-0.40	1.66	23.66	38.45	-14.79	Pass
847.65	117.17	Horizontal	22.24	-0.40	1.66	20.18	38.45	-18.27	Pass

*- Margin = Peak output power – specification limit.

OPERATING FREQUENCY RANGE: 1850 - 1910 MHz

Frequency, MHz	Field strength, dB(μV/m)	Antenna polarization	RF generator output, dBm	Antenna gain, dBi	Cable loss, dB	Peak output power, EIRP dBm	Limit, dBm	Margin, dB*	Verdict
1851.45	118.13	Vertical	14.77	9.17	2.45	21.49	33.00	-11.51	Pass
1851.85	116.11	Horizontal	12.99	9.17	2.45	19.71	33.00	-13.29	Pass
1877.65	121.26	Vertical	17.72	9.18	2.47	24.44	33.00	-8.56	Pass
1877.45	115.58	Horizontal	12.02	9.19	2.47	18.74	33.00	-14.26	Pass
1908.55	119.89	Vertical	16.62	9.20	2.49	23.33	33.00	-9.67	Pass
1909.05	114.77	Horizontal	11.69	9.20	2.49	18.40	33.00	-14.60	Pass

Reference numbers of test equipment used

HL 0415	HL 0661	HL 0812	HL 1430	HL 1565	HL 1947	HL 1984	HL 2400
HL 2432	HL 2871						

Full description is given in Appendix A.

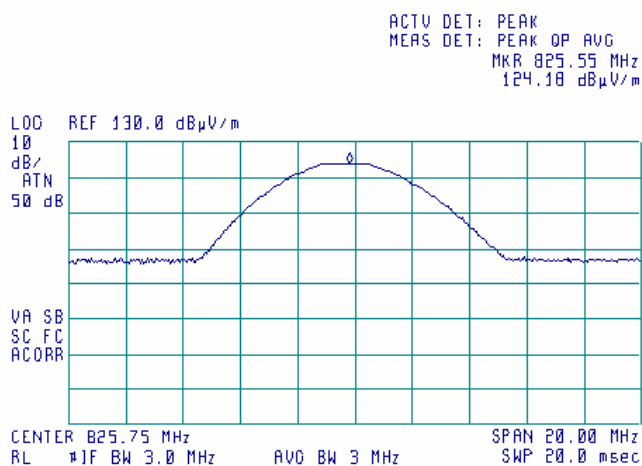
Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.1 Peak output power test results at low carrier frequency in 800 MHz band (internal antenna)

ANTENNA

Vertical

12:11:02 OCT 19, 2006

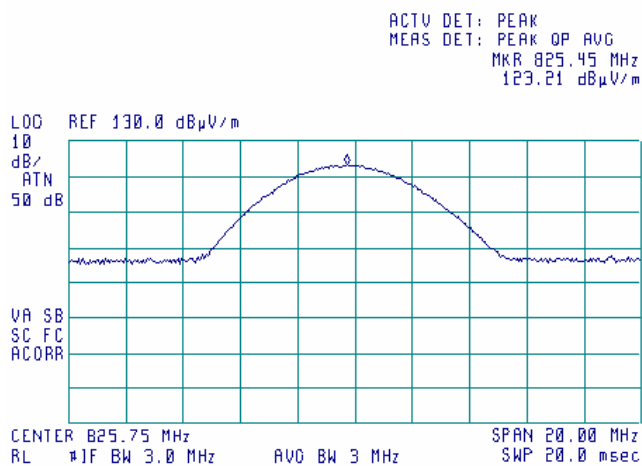


Plot 7.1.2 Peak output power test results at low carrier frequency in 800 MHz band (internal antenna)

ANTENNA

Horizontal

12:07:15 OCT 19, 2006



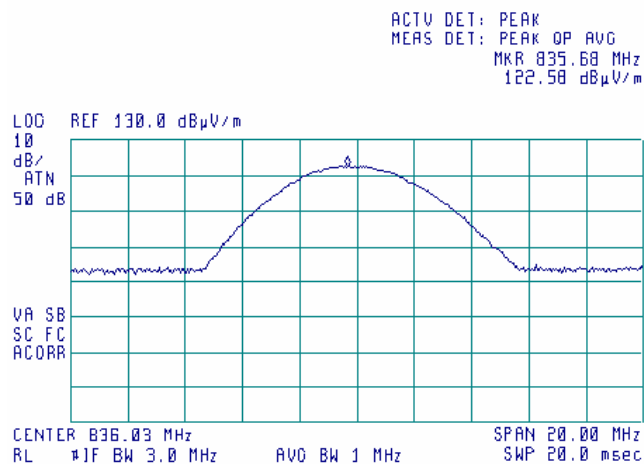
Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.3 Peak output power test results at mid carrier frequency 800 MHz band (internal antenna)

ANTENNA

Vertical

11:58:17 OCT 19, 2006

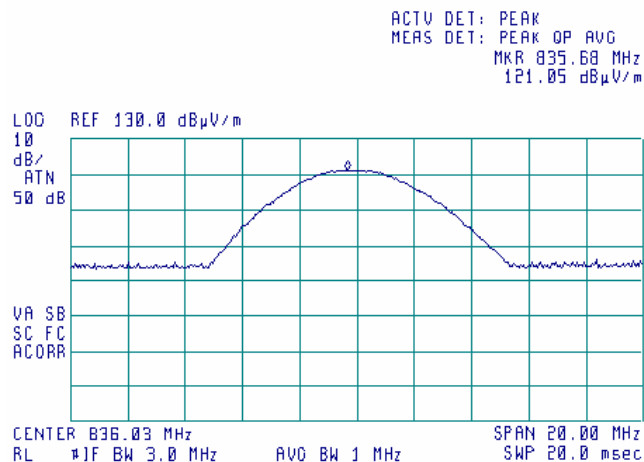


Plot 7.1.4 Peak output power test results at mid carrier frequency 800 MHz band (internal antenna)

ANTENNA

Horizontal

12:02:15 OCT 19, 2006

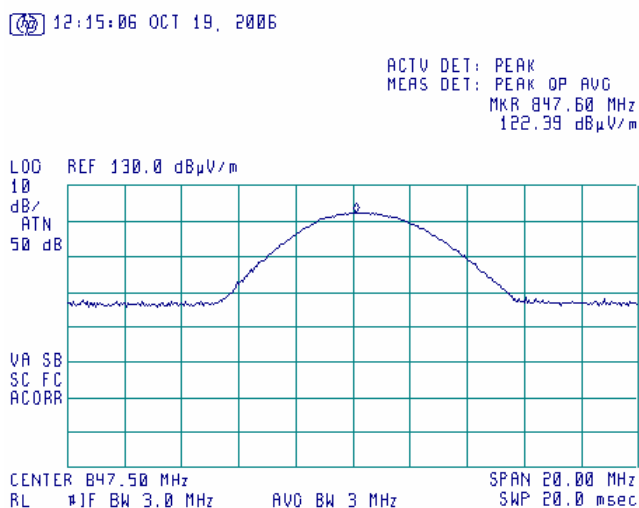


Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.5 Peak output power test results at high carrier frequency 800 MHz band (internal antenna)

ANTENNA

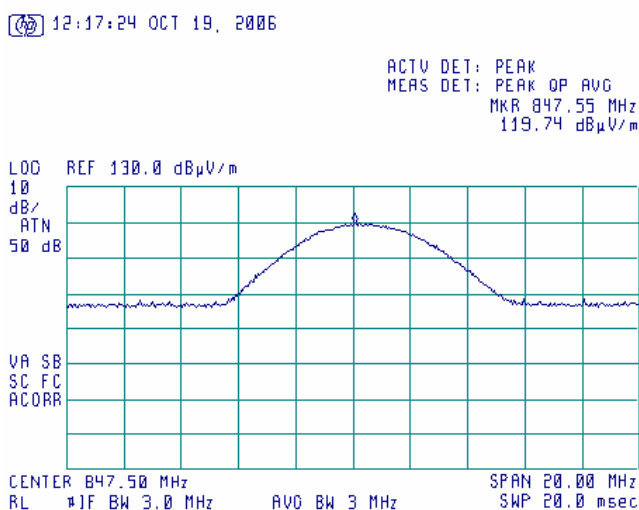
Vertical



Plot 7.1.6 Peak output power test results at high carrier frequency 800 MHz band (internal antenna)

ANTENNA

Horizontal



Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

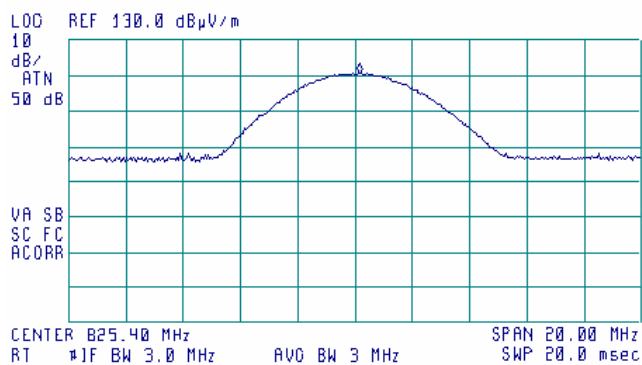
Plot 7.1.7 Peak output power test results at low carrier frequency in 800 MHz band (external antenna)

ANTENNA

Vertical

12:36:58 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 825.55 MHz
120.41 dBμV/m



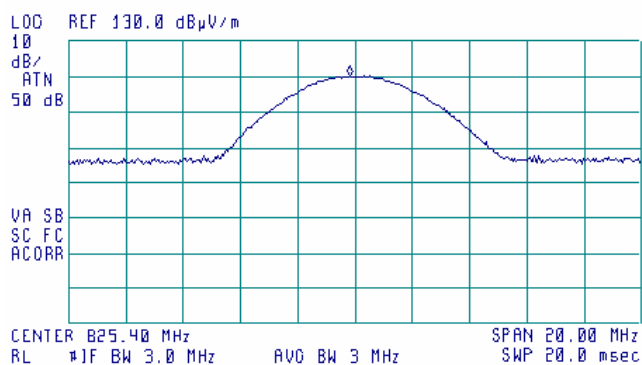
Plot 7.1.8 Peak output power test results at low carrier frequency in 800 MHz band (external antenna)

ANTENNA

Horizontal

12:33:56 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 825.20 MHz
119.99 dBμV/m



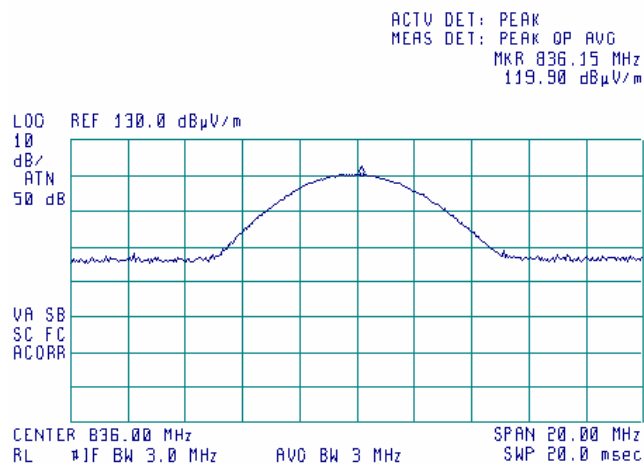
Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.9 Peak output power test results at mid carrier frequency 800 MHz band (external antenna)

ANTENNA

Vertical

12:29:05 OCT 19, 2006

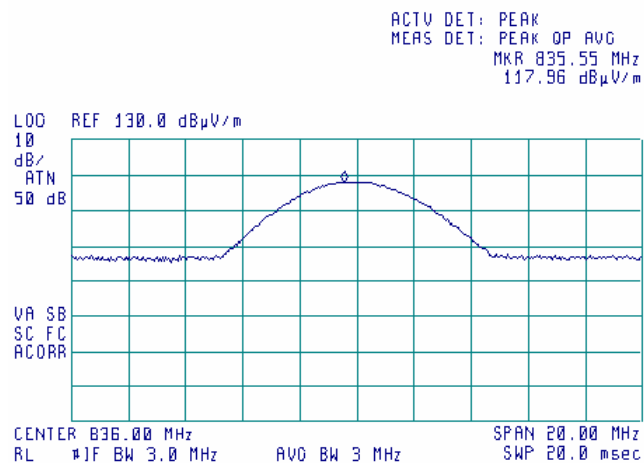


Plot 7.1.10 Peak output power test results at mid carrier frequency 800 MHz band (external antenna)

ANTENNA

Horizontal

12:31:24 OCT 19, 2006



Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

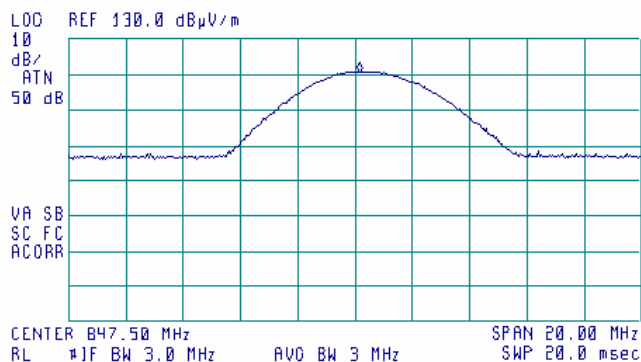
Plot 7.1.11 Peak output power test results at high carrier frequency 800 MHz band (external antenna)

ANTENNA

Vertical

12:27:04 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 847.65 MHz
120.59 dBμV/m



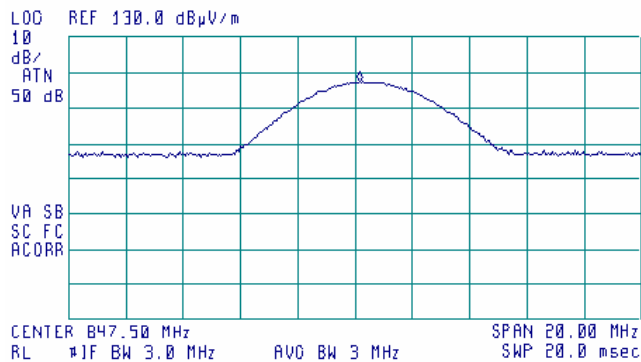
Plot 7.1.12 Peak output power test results at high carrier frequency 800 MHz band (external antenna)

ANTENNA

Horizontal

12:24:05 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 847.65 MHz
117.17 dBμV/m



Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

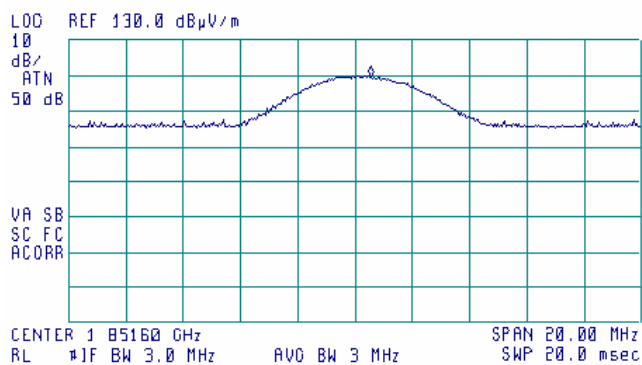
Plot 7.1.13 Peak output power test results at low carrier frequency in 1950 MHz band (internal antenna)

ANTENNA

Vertical

13:35:50 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.85215 GHz
119.91 dBμV/m



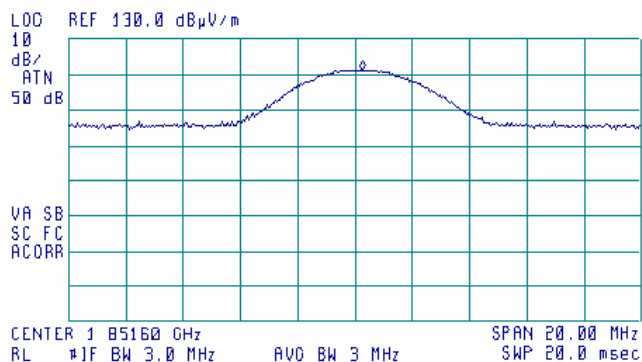
Plot 7.1.14 Peak output power test results at low carrier frequency in 1950 MHz band (internal antenna)

ANTENNA

Horizontal

13:32:06 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.85185 GHz
121.23 dBμV/m



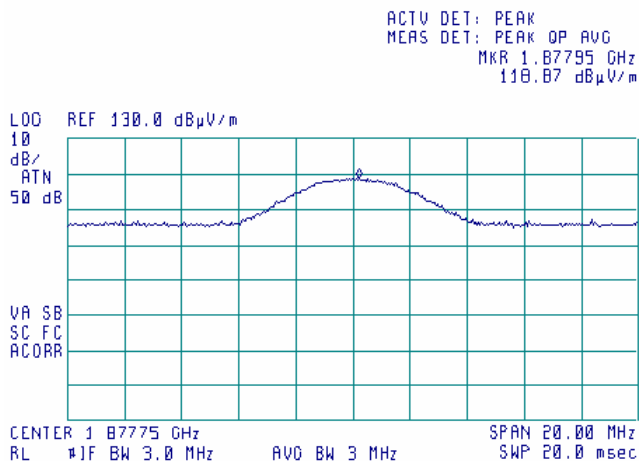
Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

Plot 7.1.15 Peak output power test results at mid carrier frequency 1950 MHz band (internal antenna)

ANTENNA

Vertical

13:26:28 OCT 19, 2006

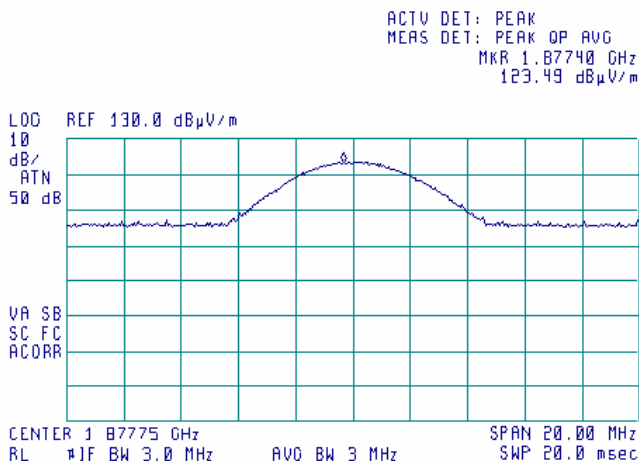


Plot 7.1.16 Peak output power test results at mid carrier frequency 1950 MHz band (internal antenna)

ANTENNA

Horizontal

13:29:57 OCT 19, 2006



Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

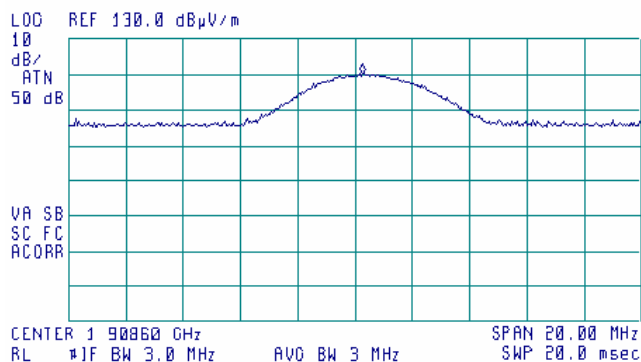
Plot 7.1.17 Peak output power test results at high carrier frequency 1950 MHz band (internal antenna)

ANTENNA

Vertical

13:46:32 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.90885 GHz
120.06 dBμV/m



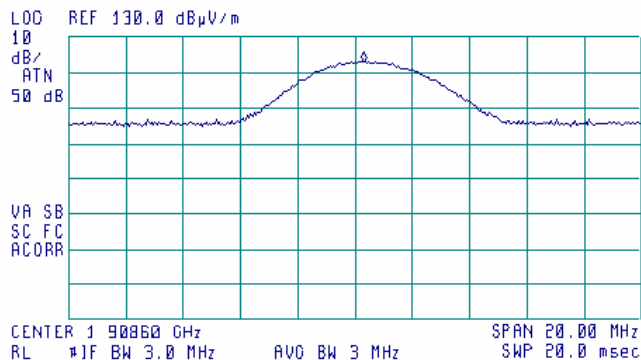
Plot 7.1.18 Peak output power test results at high carrier frequency 1950 MHz band (internal antenna)

ANTENNA

Horizontal

13:48:18 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.90890 GHz
123.07 dBμV/m



Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

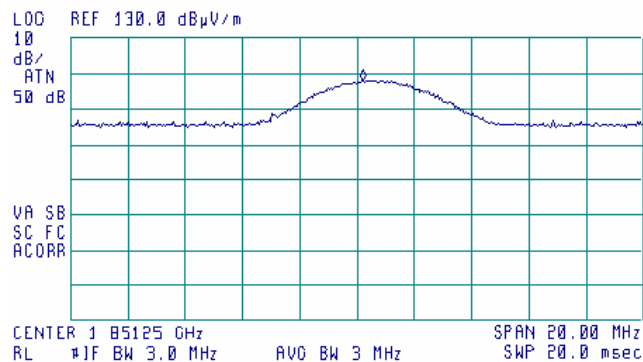
Plot 7.1.19 Peak output power test results at low carrier frequency in 1950 MHz band (external antenna)

ANTENNA

Vertical

13:10:07 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 1.85145 GHz
110.13 dBμV/m



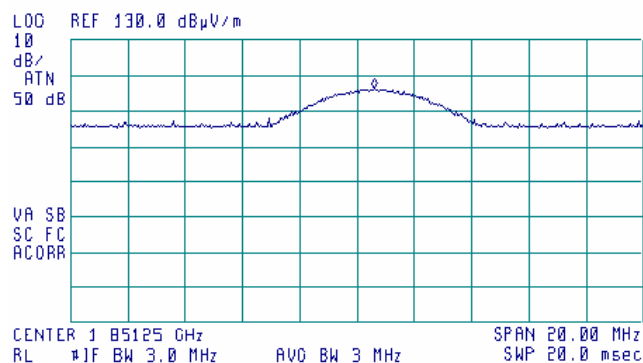
Plot 7.1.20 Peak output power test results at low carrier frequency in 1950 MHz band (external antenna)

ANTENNA

Horizontal

13:13:29 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 1.85185 GHz
116.11 dBμV/m



Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

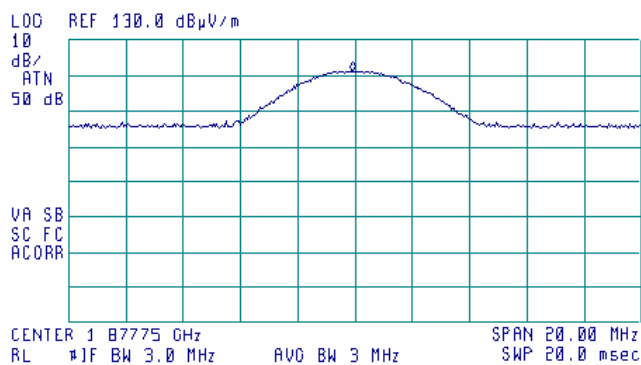
Plot 7.1.21 Peak output power test results at mid carrier frequency 1950 MHz band (external antenna)

ANTENNA

Vertical

13:20:08 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.87765 GHz
121.26 dBμV/m



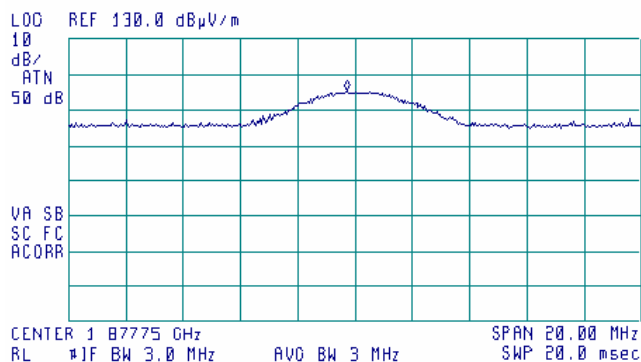
Plot 7.1.22 Peak output power test results at mid carrier frequency 1950 MHz band (external antenna)

ANTENNA

Horizontal

13:17:15 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.87745 GHz
115.58 dBμV/m



Test specification:		Section 22.913, Section 24.232, Peak output power	
Test procedure:		FCC part 22, Section 22.913; part 24, Section 24.232	
Test mode:	Compliance	Verdict:	PASS
Date:	11/5/2006		
Temperature: 22 °C	Air Pressure: 1010 hPa	Relative Humidity: 35 %	Power Supply: 120 VAC
Remarks:			

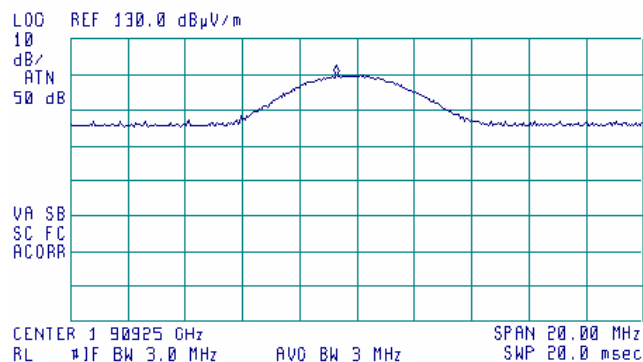
Plot 7.1.23 Peak output power test results at high carrier frequency 1950 MHz band (external antenna)

ANTENNA

Vertical

13:07:23 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 1.90855 GHz
119.89 dBμV/m



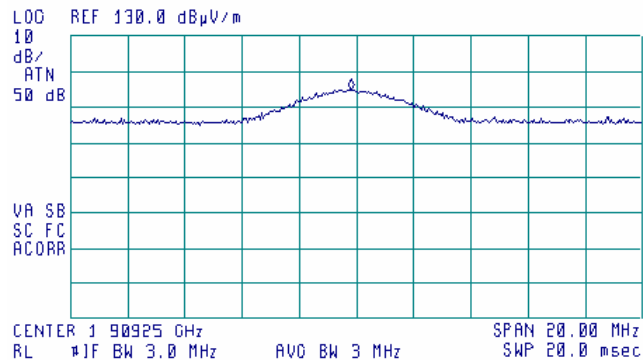
Plot 7.1.24 Peak output power test results at high carrier frequency 1950 MHz band (external antenna)

ANTENNA

Horizontal

13:04:11 OCT 19, 2006

ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 1.90905 GHz
114.77 dBμV/m



Test specification:	Section 2.1091, RF radiation exposure evaluation		
Test procedure:	47 CFR, Section 1.1307(b)		
Test mode:	Compliance	Verdict:	PASS
Date:	11/2/2006		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

7.2 RF exposure

7.2.1 General

This test was performed to determine the minimum safe distance between the transmitter antenna and human to avoid public exposure in excess of limits for general population (uncontrolled exposure). Specification test limits are given in Table 7.2.1.

Table 7.2.1 RF exposure limits

Frequency range, MHz	Power density*		Electric field strength**, V/m
	mW/cm ²	W/m ²	
824 – 849	0.55	5.5	45.5
1850 – 1910	1.00	10.0	61.4

* - Power density limit within 300 - 1500 MHz was calculated according to the following equation: $S = F / 1500$, where S is power density in mW/cm² and F is frequency in MHz

** - Electric field strength limit was calculated from power density as follows: $E = \sqrt{S \times 120 \times \pi}$, where E is electric field strength in V/m and S is power density in W/m²

7.2.2 Test procedure

7.2.2.1 The EUT, connected to the antenna providing the maximum directional gain, was set up as shown in Figure 7.2.1.

7.2.2.2 The E-field probe was pointed to the EUT antenna zero azimuth at a 3 m distance, the maximum field strength reading was recorded in Table 7.2.2.

7.2.2.3 The E-field probe was slowly moved toward the EUT until E-field equivalent to the maximum permitted power density was measured.

7.2.2.4 The obtained antenna to probe distance was recorded in Table 7.2.2 as a minimum separation distance.

7.2.2.5 The test was repeated at the rest of test distances according to Table 7.2.2.

7.2.2.6 The test was repeated for the second band according to Table 7.2.3.

7.2.2.7 The test was repeated for EUT with external according to Table 7.2.4, Table 7.2.5.

Test specification:	Section 2.1091, RF radiation exposure evaluation		
Test procedure:	47 CFR, Section 1.1307(b)		
Test mode:	Compliance	Verdict:	PASS
Date:	11/2/2006		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

Table 7.2.2 Maximum permissible exposure (MPE) measurement in 800 MHz band with internal antenna

Test distance, m	Field strength, V/m	Equivalent power density, mW/cm ²	Limit, mW/cm ²	Margin, mW/cm ²	Verdict
3.0	0.8	0.00016985	0.55	-0.54983	Pass
2.5	1.2	0.00038217	0.55	-0.54962	Pass
2.0	1.3	0.00044851	0.55	-0.54955	Pass
1.5	1.3	0.00044851	0.55	-0.54955	Pass
1.0	1.6	0.00067941	0.55	-0.54932	Pass
0.5	2.2	0.0012845	0.55	-0.54872	Pass
0.3	3.0	0.00238854	0.55	-0.54761	Pass
0.2	4.1	0.00446125	0.55	-0.54554	Pass
0.1	6.1	0.00987527	0.55	-0.54012	Pass

* - Equivalent power density was calculated from electric field strength as follows: $S = 0.1 \times E^2 / (120 \times \pi)$, where E is electric field strength in V/m and S is power density in mW/cm²

Table 7.2.3 Maximum permissible exposure (MPE) measurement in 1900 MHz band with internal antenna

Test distance, m	Field strength, V/m	Equivalent power density, mW/cm ²	Limit, mW/cm ²	Margin, mW/cm ²	Verdict
3.0	0.7	0.00013004	1.0	-0.99987	Pass
2.5	1.0	0.00026539	1.0	-0.99973	Pass
2.0	1.3	0.00044851	1.0	-0.99955	Pass
1.5	1.5	0.00059713	1.0	-0.9994	Pass
1.0	2.0	0.00106157	1.0	-0.99894	Pass
0.5	3.7	0.00363323	1.0	-0.99637	Pass
0.3	5.0	0.00663482	1.0	-0.99337	Pass
0.2	5.2	0.00717622	1.0	-0.99282	Pass
0.1	7.5	0.01492834	1.0	-0.98507	Pass

* - Equivalent power density was calculated from electric field strength as follows: $S = 0.1 \times E^2 / (120 \times \pi)$, where E is electric field strength in V/m and S is power density in mW/cm²

Test specification:	Section 2.1091, RF radiation exposure evaluation		
Test procedure:	47 CFR, Section 1.1307(b)		
Test mode:	Compliance	Verdict:	PASS
Date:	11/2/2006		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

Table 7.2.4 Maximum permissible exposure (MPE) measurement in 800 MHz band with external antenna

Test distance, m	Field strength, V/m	Equivalent power density, mW/cm ²	Limit, mW/cm ²	Margin, mW/cm ²	Verdict
3.0	0.9	0.00021497	0.55	-0.54979	Pass
2.5	1.0	0.00026539	0.55	-0.54973	Pass
2.0	1.2	0.00038217	0.55	-0.54962	Pass
1.5	1.3	0.00044851	0.55	-0.54955	Pass
1.0	1.5	0.00059713	0.55	-0.54940	Pass
0.5	1.5	0.00059713	0.55	-0.54940	Pass
0.3	2.1	0.00117038	0.55	-0.54883	Pass
0.2	3.2	0.00271762	0.55	-0.54728	Pass
0.1	4.1	0.00446125	0.55	-0.54554	Pass

* - Equivalent power density was calculated from electric field strength as follows: $S = 0.1 \times E^2 / (120 \times \pi)$, where E is electric field strength in V/m and S is power density in mW/cm²

Table 7.2.5 Maximum permissible exposure (MPE) measurement in 1900 MHz band with external antenna

Test distance, m	Field strength, V/m	Equivalent power density, mW/cm ²	Limit, mW/cm ²	Margin, mW/cm ²	Verdict
3.0	0.7	0.00013004	1.0	-0.99987	Pass
2.5	0.9	0.00021497	1.0	-0.99979	Pass
2.0	1.2	0.00038217	1.0	-0.99962	Pass
1.5	1.5	0.00059713	1.0	-0.99940	Pass
1.0	2.0	0.00106157	1.0	-0.99894	Pass
0.5	2.5	0.0016587	1.0	-0.99834	Pass
0.3	2.5	0.0016587	1.0	-0.99834	Pass
0.2	4.5	0.0053742	1.0	-0.99463	Pass
0.1	5.1	0.00690287	1.0	-0.99310	Pass

* - Equivalent power density was calculated from electric field strength as follows: $S = 0.1 \times E^2 / (120 \times \pi)$, where E is electric field strength in V/m and S is power density in mW/cm²

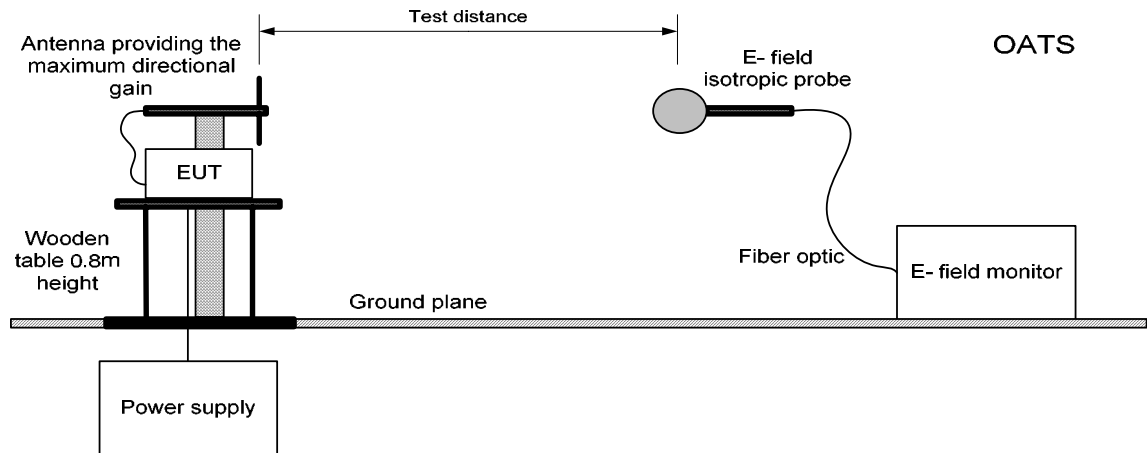
Reference numbers of test equipment used

HL 2976							
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Full description is given in Appendix A.

Test specification:	Section 2.1091, RF radiation exposure evaluation		
Test procedure:	47 CFR, Section 1.1307(b)		
Test mode:	Compliance	Verdict:	PASS
Date:	11/2/2006		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

Figure 7.2.1 Maximum permissible exposure (MPE) measurement set up



Test specification:	Section 2.1091, RF radiation exposure evaluation		
Test procedure:	47 CFR, Section 1.1307(b)		
Test mode:	Compliance	Verdict:	PASS
Date:	11/2/2006		
Temperature: 23 °C	Air Pressure: 1011 hPa	Relative Humidity: 40 %	Power Supply: 120 VAC
Remarks:			

Photograph 7.2.1 Maximum permissible exposure (MPE) measurement set up, EUT with internal antenna



Photograph 7.2.2 Maximum permissible exposure (MPE) measurement set up, EUT with external antenna



8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0415	Cable, Coax, RF, RG-214	HL	CC-3	056	02-Dec-05	02-Dec-06
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	Hewlett Packard	83640B	3614A00266	14-Sep-06	14-Sep-07
0812	Cable Coax, RG-214, 11.5 m, N-type connectors	HL	C214-11	148	02-Dec-05	02-Dec-06
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A00262,3705A00217	01-Sep-06	01-Sep-07
1565	Antenna, Dipole, Tunable 500 - 1000 MHz	Electro-Metrics	TDS-30-2	334	29-Jan-06	29-Jan-07
1947	Cable 18GHz, 6.5 m, blue	Rhophase Microwave Limited	NPS-1803A-6500-NPS	T4974	17-Oct-06	17-Oct-07
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W, N-type	EMC Test Systems	3115	9911-5964	03-Mar-06	03-Mar-07
2400	Cable 40GHz, 1.5 m, green	Rhophase Microwave Limited	KPS-1503A-1500-KPS	X2946	21-Jun-06	21-Jun-07
2432	Antenna, Double-Ridged Waveguide Horn 1-18 GHz	EMC Test Systems	3115	00027177	03-Mar-06	03-Mar-07
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	16-Feb-06	16-Feb-07
2976	Fieldmeter with EF2 isotropic probe (100kHz-2.5GHz) & electric field probe (0.1V/m-200V/m),supplied in a carrying case.	CHAUVIN ARNOUX	C.A 43	2976	01-Jan-06	01-Jan-07

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of ISO/IEC 17025 (or alternately ANSI/NCSL Z540-1).

The laboratory calibrates its measurement standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements. The Hermon Labs EMC measurements uncertainty is given in the table above.

10 APPENDIX C Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility. Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47) and by Industry Canada for electromagnetic emissions (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, telecommunications, environmental, safety standards, and by AMTAC (UK) for safety of medical devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01) and approved by Israel Ministry of environmental protection, radiation hazards department (Permit number 1158).

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Person for contact: Mr. Alex Usoskin, CEO.

11 APPENDIX D Specification references

47CFR part 22:2005	Public Mobile Services
47CFR part 24: 2005	Personal Communications Services
ANSI/TIA/EIA-603-A:2001	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

12 APPENDIX E Abbreviations and acronyms

AC	alternating current
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	decibel referred to one microampere
DC	direct current
EMC	electromagnetic compatibility
EMI	electromagnetic interference
EUT	equipment under test
GHz	gigahertz
GND	ground
H	height
HCP	horizontal coupling plane
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
kV	kilovolt
L	length
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μ s	microsecond
NA	not applicable
NB	narrow band
NP	normal performance
NT	not tested
OATS	open area test site
Ω	Ohm
QP	quasi-peak
PM	pulse modulation
PS	power supply
RE	radiated emission
RF	radio frequency
rms	root mean square
s	second
V	volt
W	width

13 APPENDIX F Test equipment correction factors

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

Antenna factor
Biconilog antenna EMCO Model 3141
Ser.No.1011, HL 0604

Frequency, MHz	Antenna Factor, dB(1/m)	Frequency, MHz	Antenna Factor, dB(1/m)
26	7.8	940	24.0
28	7.8	960	24.1
30	7.8	980	24.5
40	7.2	1000	24.9
60	7.1	1020	25.0
70	8.5	1040	25.2
80	9.4	1060	25.4
90	9.8	1080	25.6
100	9.7	1100	25.7
110	9.3	1120	26.0
120	8.8	1140	26.4
130	8.7	1160	27.0
140	9.2	1180	27.0
150	9.8	1200	26.7
160	10.2	1220	26.5
170	10.4	1240	26.5
180	10.4	1260	26.5
190	10.3	1280	26.6
200	10.6	1300	27.0
220	11.6	1320	27.8
240	12.4	1340	28.3
260	12.8	1360	28.2
280	13.7	1380	27.9
300	14.7	1400	27.9
320	15.2	1420	27.9
340	15.4	1440	27.8
360	16.1	1460	27.8
380	16.4	1480	28.0
400	16.6	1500	28.5
420	16.7	1520	28.9
440	17.0	1540	29.6
460	17.7	1560	29.8
480	18.1	1580	29.6
500	18.5	1600	29.5
520	19.1	1620	29.3
540	19.5	1640	29.2
560	19.8	1660	29.4
580	20.6	1680	29.6
600	21.3	1700	29.8
620	21.5	1720	30.3
640	21.2	1740	30.8
660	21.4	1760	31.1
680	21.9	1780	31.0
700	22.2	1800	30.9
720	22.2	1820	30.7
740	22.1	1840	30.6
760	22.3	1860	30.6
780	22.6	1880	30.6
800	22.7	1900	30.6
820	22.9	1920	30.7
840	23.1	1940	30.9
860	23.4	1960	31.2
880	23.8	1980	31.6
900	24.1	2000	32.0
920	24.1		

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

Antenna factor
Double-ridged wave guide horn antenna
EMC Test Systems, model 3115, serial no: 00027177, HL 2432

Frequency, MHz	Antenna gain, dBi	Antenna factor. dB(1/m)
1000.0	5.5	24.7
1500.0	8.0	25.7
2000.0	8.4	27.8
2500.0	9.3	28.9
3000.0	9.0	30.7
3500.0	9.3	31.8
4000.0	9.3	33.0
4500.0	10.4	32.8
5000.0	10.0	34.2
5500.0	10.1	34.9
6000.0	10.6	35.2
6500.0	11.0	35.4
7000.0	10.8	36.3
7500.0	10.4	37.3
8000.0	10.8	37.5
8500.0	10.8	38.0
9000.0	11.0	38.3
9500.0	11.5	38.3
10000.0	11.5	38.7
10500.0	11.9	38.7
11000.0	12.2	38.9
11500.0	11.9	39.5
12000.0	12.3	39.5
12500.0	12.7	39.4
13000.0	12.0	40.5
13500.0	12.0	40.8
14000.0	11.6	41.5
14500.0	12.2	41.3
15000.0	13.6	40.2
15500.0	15.3	38.7
16000.0	15.8	38.5
16500.0	14.8	39.8
17000.0	12.9	41.9
17500.0	9.2	45.8
18000.0	6.2	49.1

Antenna factor is to be added to receiver meter reading in dB(μ V) to convert it into field intensity in dB(μ V/m).

Cable loss
Cable Coaxial, RG-58/RG-214, s/n 056, HL 0415
+ Cable Coaxial, RG-214, 11.5m, s/n 148, HL 0812

No.	Frequency, MHz	Cable loss, dB	Measured uncertainty, dB
1	20	0.73	±0.12
2	30	0.91	
3	50	1.2	
4	80	1.56	
5	100	1.76	
6	200	2.59	
7	300	3.26	
8	400	3.93	
9	500	4.42	
10	600	4.92	
11	700	5.36	
12	800	5.88	
13	900	6.41	
14	1000	6.71	
15	1500	8.63	
16	2000	10.39	

Cable loss
Cable 18 GHz, 6.5 m, blue, model: NPS-1803A-6500-NPS, S/N T4974, HL 1947

Frequency, GHz	Cable loss, dB
0.03	0.30
0.05	0.38
0.10	0.53
0.20	0.74
0.30	0.91
0.40	1.05
0.50	1.18
0.60	1.29
0.70	1.40
0.80	1.50
0.90	1.59
1.00	1.68
1.10	1.77
1.20	1.86
1.30	1.94
1.40	2.01
1.50	2.08
1.60	2.16
1.70	2.22
1.80	2.29
1.90	2.36
2.00	2.42
2.10	2.48
2.20	2.54
2.30	2.60
2.40	2.66
2.50	2.71
2.60	2.77
2.70	2.83
2.80	2.89
2.90	2.95
3.10	3.06
3.30	3.17
3.50	3.28
3.70	3.39
3.90	3.51
4.10	3.62
4.30	3.76
4.50	3.87
4.70	4.01
4.90	4.10
5.10	4.21
5.30	4.31
5.50	4.43
5.70	4.56
5.90	4.71

Frequency, GHz	Cable loss, dB
6.10	4.87
6.30	4.95
6.50	4.94
6.70	4.88
6.90	4.87
7.10	4.83
7.30	4.85
7.50	4.86
7.70	4.91
7.90	4.96
8.10	5.03
8.30	5.08
8.50	5.13
8.70	5.21
8.90	5.22
9.10	5.34
9.30	5.35
9.50	5.52
9.70	5.51
9.90	5.66
10.10	5.70
10.30	5.78
10.50	5.79
10.70	5.82
10.90	5.86
11.10	5.94
11.30	6.06
11.50	6.21
11.70	6.44
11.90	6.61
12.10	6.76
12.40	6.68
13.00	6.66
13.50	6.81
14.00	6.90
14.50	6.90
15.00	6.97
15.50	7.17
16.00	7.28
16.50	7.27
17.00	7.38
17.50	7.68
18.00	7.92

Rhophase Microwave Limited, model: KPS-1503A-1500-KPS,
HL 2400

Frequency, GHz	Insertion loss, dB
0.03	0.06
0.05	0.08
0.1	0.15
0.2	0.23
0.3	0.29
0.5	0.37
0.7	0.46
0.9	0.53
1.1	0.58
1.3	0.65
1.5	0.66
1.7	0.72
1.9	0.76
2.1	0.79
2.3	0.85
2.5	0.90
2.7	0.91
2.9	0.97
3.1	0.97
3.3	1.03
3.5	1.06
3.7	1.10
3.9	1.13
4.1	1.16
4.3	1.18
4.5	1.21
4.7	1.23
4.9	1.26
5.1	1.28
5.3	1.31
5.5	1.32
5.7	1.36
5.9	1.37
6.1	1.38
6.3	1.44
6.5	1.46
6.7	1.49
6.9	1.50
7.1	1.51
7.3	1.55
7.5	1.56
7.7	1.58
7.9	1.60
8.1	1.61
8.3	1.68
8.5	1.68
8.7	1.75
8.9	1.74
9.1	1.81
9.3	1.79
9.5	1.86
9.7	1.85
9.9	1.87
10.1	1.88

Frequency, GHz	Insertion loss, dB
10.30	1.82
10.50	1.92
10.70	1.86
10.90	1.96
11.10	1.90
11.30	1.99
11.50	1.95
11.70	2.00
11.90	2.01
12.10	1.99
12.40	2.06
13.00	2.11
13.50	2.17
14.00	2.36
14.50	2.32
15.00	2.30
15.50	2.34
16.00	2.34
16.50	2.40
17.00	2.46
17.50	2.54
18.00	2.61
18.50	2.59
19.00	2.59
19.50	2.67
20.00	2.62
20.50	2.73
21.00	2.71
21.50	2.78
22.00	2.83
22.50	2.81
23.00	2.91
23.50	2.97
24.00	2.98
24.50	2.97
25.00	3.03
25.50	3.04
26.00	3.11
26.50	2.97
27.00	3.15
28.00	3.07
29.00	3.13
30.00	3.13
31.00	3.18
32.00	3.31
33.00	3.32
34.00	3.37
35.00	3.36
36.00	3.46
37.00	3.49
38.00	3.52
39.00	3.62
40.00	3.77