

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

TABLE OF CONTENTS FOR A DIRECT SEQUENCE SPREAD SPECTRUM

TEST REPORT CONTAINING:

PAGE 1.....	LETTER OF EXPLANATION
PAGE 2.....	LIST OF TEST EQUIPMENT
PAGE 3.....	TEST PROCEDURES
PAGE 4.....	OCCUPIED BANDWIDTH & POWER OUTPUT
PAGE 5.....	6 dB BANDWIDTH PLOT
PAGE 6.....	METHOD OF MEASURING RF CONDUCTED SPURIOUS EMISSIONS AT ANTENNA TERMINALS DATA
PAGE 7-8.....	RADIATION INTERFERENCE TEST DATA
PAGE 9.....	METHOD OF MEASURING RADIATED SPURIOUS EMISSIONS
PAGE 10-11.....	POWERLINE CONDUCTED INTERFERENCE
PAGE 12.....	RADIATED SPURIOUS EMISS. INTO ADJACENT RESTRICTED BANDS
PAGE 13-14.....	BANDEDGE PLOTS
PAGE 15.....	POWER SPECTRAL DENSITY
PAGE 16.....	MPE CALCULATION

EXHIBIT ATTACHMENTS:

EXHIBIT 1.....	REQUEST FOR CONFIDENTIALITY LETTER
EXHIBIT 2.....	BLOCK DIAGRAM
EXHIBIT 3.....	SCHEMATICS
EXHIBIT 4.....	USERS MANUAL
EXHIBIT 5.....	LABEL SAMPLE
EXHIBIT 6.....	LABEL LOCATION
EXHIBIT 7.....	EXTERNAL PHOTOGRAPHS
EXHIBIT 8.....	INTERNAL PHOTOGRAPHS
EXHIBIT 9.....	OPERATIONAL DESCRIPTION
EXHIBIT 10.....	TEST SET UP PHOTOGRAPH
EXHIBIT 11.....	SAR TEST REPORT

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

TABLE OF CONTENTS LIST

SEPTEMBER 4, 2003

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

SUBJECT: PARKERVISION INC.

FCC ID: JFE-D2D00002

To Whom It May Concern:

The attached application is for a direct sequence spread spectrum Wireless lan with an integrated antenna. This wireless lan complies to the 802.11 specifications and operates in the 2412-2462 MHz band.

Should you have any questions or require any further information with regards to this, please feel free to contact me.

Sincerely,

Mario R. de Aranzeta C.E.T.

MRD/sh
Encl.

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 1 of 16

EMC Equipment List

Device	Manufacturer	Model	Serial Number	Cal/Char Date Listed	Due Date
3-Meter OATS	TEI	N/A	N/A	1/13/03	1/13/06
Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05
Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 2/17/03	2/17/05
LISN	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
LISN	Electro-Metrics	EM-7820	2682	CAL 3/12/03	3/12/05
Log-Periodic Antenna	Eaton	96005	1243	CAL 5/8/03	5/8/05
Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CAL 3/4/03	3/4/05
Peak Power Meter	HP	8900C	2131A00545	CAL 7/2/03	7/2/05
Power Meter	HP	432A	1141A07655	CAL 4/15/03	4/15/05
Silver Tower Preamplifier	HP	8449B	3008A01075	CHAR 1/28/02	1/28/04
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/14/02	10/14/04
Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 10/14/02	10/14/04
Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/14/02	10/14/04
Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03
Harmonic Mixer	HP	11970K	3003A04991	N/A	N/A
HORN	SYSTRON DONNOR	DBE-520-20	N/A	N/A	N/A

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 2 of 16

TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC. Shielded interface cables were used in all cases except for cables connecting to the telephone line and the power cords. A test program was run which simulated a normal data transmission on a network.

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 76°F with a humidity of 55%.

BANDWIDTH 6.0dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=1.0MHz and the video bandwidth (VBW) =3.0MHz and the span set as shown on plot.

POWER OUTPUT: The RF power output was measured at the antenna feed point using a peak power meter.

ANTENNA CONDUCTED EMISSIONS: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30MHz to the 10th Harmonic of the fundamental. Above 1.0 GHz the resolution bandwidth was 1.0 MHz and the VBW = 3.0 MHz and the span to 50 MHz.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a pre-selector. The bandwidth (RBW) of the spectrum analyzer was 100kHz up to 1GHz and 1.0MHz above 1GHz with an appropriate sweep speed. The VBW above 1.0GHz was = 3.0MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 53°F with a humidity of 17%.

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

NAME OF TEST: 6.0dB BANDWIDTH

RULES PART NO.: 15.247(a)(2)

REQUIREMENTS: The 6.0dB bandwidth must be greater than 500 kHz.

MEASUREMENT: See plot on next page.

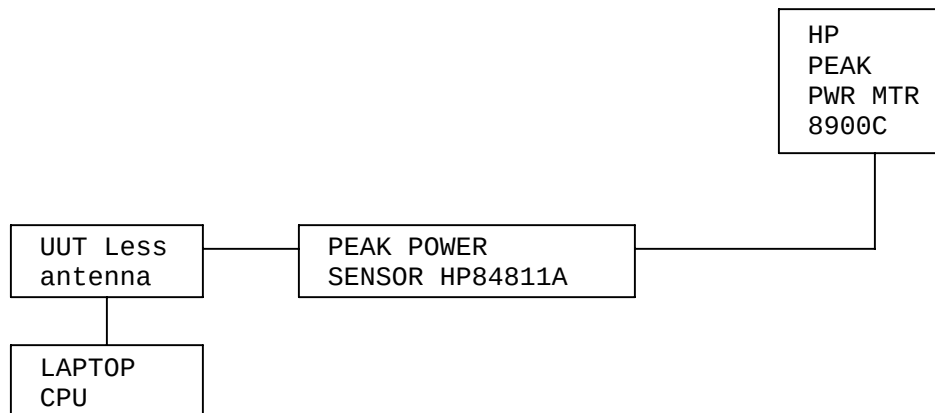
**MEASUREMENT
DATA:** See plot

NAME OF TEST: POWER OUTPUT

RULES PART NO.: 15.247(b) 1.0Watt or +30dBm

MEASUREMENT: 21.2 dBm at 2412 MHz

15.247(c) Method of Measuring RF Power output: The Peak power Sensor was connected in place of the antenna. Measurements were made on 3 channels and the highest is reported above.



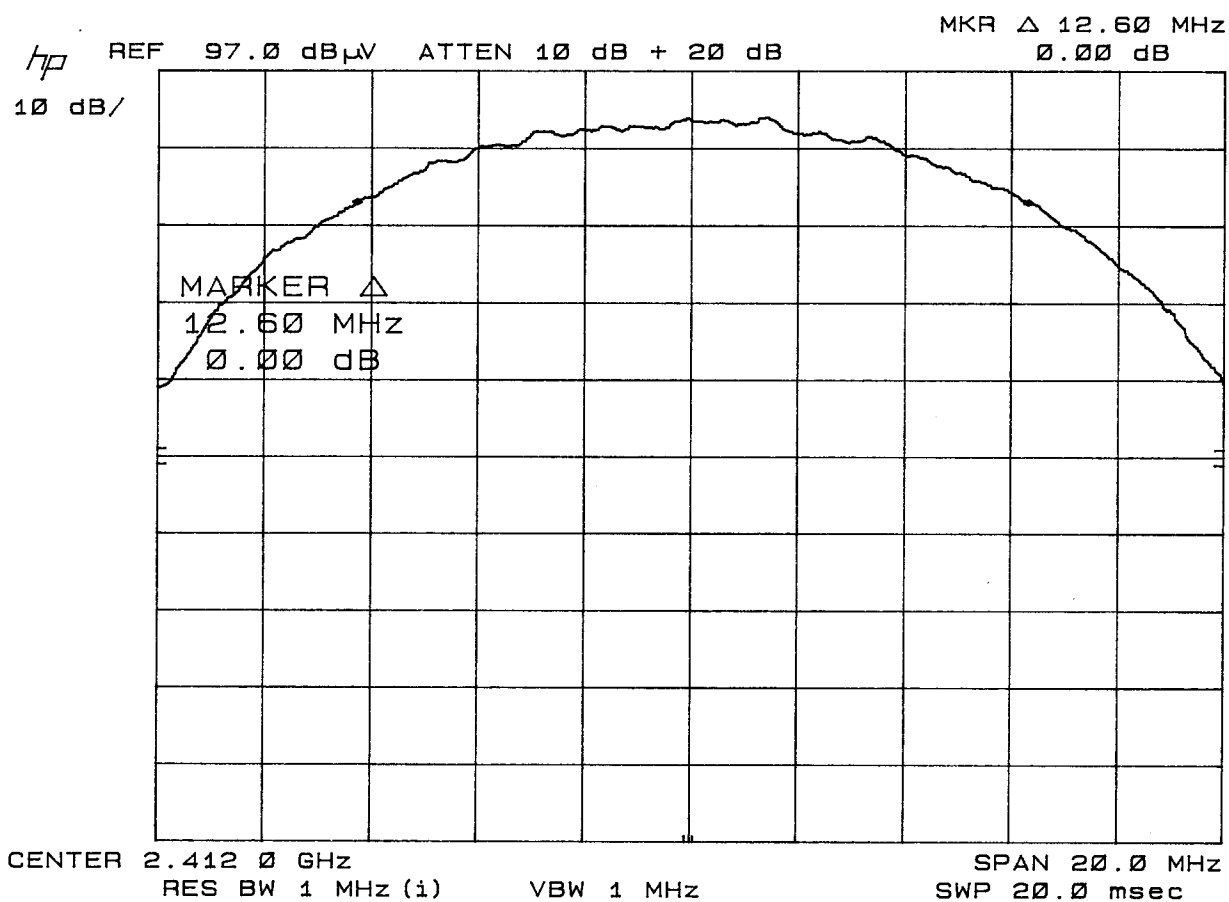
APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 4 of 16

6 dB BANDWIDTH PLOT



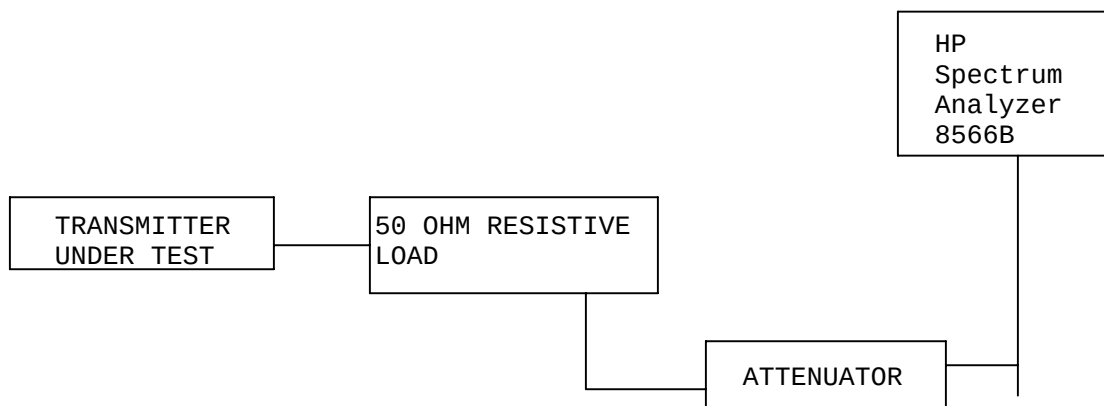
APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 5 of 16

15.247(c) Method of Measuring RF Conducted Spurious Emissions



NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

REQUIREMENTS: Emissions must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

EMISSION FREQUENCY MHz	dB BELOW CARRIER
2412	0
804	57
2327	61.9
3220	73.6
4830	74.9
2435	0
812	55.9
2318	61.94
4874	70.94
5688	76.1
2462	0
820	54.6
4102	67.9
5745	73.6
7385	69.1
10,665	73
12,306	61.2
13,951	69.9

NOTE: THE SPECTRUM WAS SCANNED TO THE TENTH HARMONIC.

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 6 of 16

15.247(c), 15.205 & 15.209(b) Field strength of spurious emissions:

REQUIREMENTS:

FIELD STRENGTH of Fundamental: 902-928MHz 2.4-2.4835GHz 127.38dBuV/m @3m	FIELD STRENGTH of Harmonics 54 dBuV/m @3m	S15.209 30 - 88 MHz 40 dBuV/m @3M 88 -216 MHz 43.5 216 -960 MHz 46 ABOVE 960 MHz 54dBuV/m
--	---	---

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 20 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209, WHICHEVER IS THE LESSER ATTENUATION.

REQUIREMENTS: Emissions that fall in the restricted bands (15.205) must be less than 54 dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

TEST DATA: Peak Emissions

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m
2,412.0	803.00	27.9	H	4.01	24.06	55.97
2,412.0	803.00	32.6	V	4.01	22.68	59.29
2,412.0	1,608.00	20.2	V	2.59	27.29	50.08
2,412.0	1,608.00	22.9	H	2.59	27.27	52.76
2,412.0	2,412.00	70.8	H	3.33	29.26	103.39
2,412.0	2,412.00	79.7	V	3.33	29.28	112.31
2,412.0	3,216.00	17.8	V	4.02	30.93	52.75
2,412.0	3,216.00	18.5	H	4.02	30.98	53.50
2,412.0	4,019.00	13.3	H	4.83	33.10	51.23
2,412.0	4,019.00	15.0	V	4.83	32.90	52.73
2,412.0	4,824.00	13.4	H	5.95	34.14	53.49
2,412.0	4,824.00	15.9	V	5.95	34.04	55.89
2,412.0	7,237.00	10.0	V	7.05	36.75	53.80
2,437.0	4,874.00	15.0	H	6.02	34.30	55.32
2,437.0	4,874.00	19.0	V	6.02	34.20	59.22
2,462.0	821.00	37.0	H	4.04	24.68	65.72
2,462.0	821.00	37.0	H	4.04	24.68	65.72
2,462.0	1,641.00	18.4	H	2.62	27.38	48.40
2,462.0	1,641.00	14.4	V	2.62	27.38	44.40
2,462.0	2,462.00	70.5	H	3.37	29.34	103.21
2,462.0	2,462.00	78.8	V	3.37	29.35	111.52
2,462.0	2,485.50	18.7	V	3.39	29.38	51.49
2,462.0	2,485.50	29.4	V	3.39	29.38	62.17
2,462.0	3,282.00	16.8	H	4.08	31.06	51.94
2,462.0	3,282.00	22.1	V	4.08	31.06	57.24
2,462.0	4,103.00	15.1	H	4.94	33.10	53.14
2,462.0	4,103.00	18.3	V	4.94	32.92	56.16
2,462.0	4,924.00	13.4	H	6.09	34.46	53.95
2,462.0	4,924.00	17.6	V	6.09	34.36	58.05

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

TEST DATA: Average Emissions

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m
2,462.0	2,485.50	12.8	H	3.39	29.38	45.57
2,462.0	3,282.00	16.8	H	4.08	31.12	52.00
2,462.0	4,103.00	7.2	V	4.94	33.10	45.24
2,462.0	4,924.00	8.6	V	6.09	34.36	49.05
2,412.0	4,824.00	11.9	V	5.95	34.14	51.99
2,437.0	4,874.00	10.1	V	6.02	34.20	50.32
2,437.0	4,874.00	7.0	H	6.02	34.20	47.22

TEST DATA:

Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
43.80	17.2	H	0.74	12.99	30.93	61.38
48.00	14.3	H	0.78	12.08	27.16	65.15
52.60	15.1	H	0.83	10.66	26.59	65.72
52.60	20.0	V	0.83	9.97	30.80	61.51
58.70	23.0	V	0.89	8.16	32.05	60.26
60.00	19.0	H	0.90	7.60	27.50	64.81
62.20	21.1	V	0.92	6.96	28.98	63.33
66.60	16.2	V	0.97	5.71	22.88	69.43
66.60	26.6	H	0.97	5.30	32.87	59.44
70.00	34.9	H	1.00	5.10	41.00	51.31
110.00	20.5	H	1.24	10.00	31.74	60.57
120.00	13.5	V	1.28	11.30	26.08	66.23
120.00	18.3	H	1.28	10.30	29.88	62.43
130.00	13.0	H	1.32	12.60	26.92	65.39
140.00	13.0	H	1.36	14.70	29.06	63.25
170.00	10.1	H	1.56	15.10	26.76	65.55
200.30	15.4	H	1.80	12.01	29.21	63.10
200.30	18.4	V	1.80	12.08	32.28	60.03
220.00	14.5	V	1.88	11.30	27.68	64.63
220.00	18.4	V	1.88	11.30	31.58	60.73
264.00	12.5	V	2.06	12.76	27.32	64.99
264.00	19.6	H	2.06	13.24	34.90	57.41
308.00	11.5	V	2.25	16.00	29.75	62.56
308.00	15.7	H	2.25	16.60	34.55	57.56
530.80	12.4	V	3.19	18.19	33.78	58.53
801.20	14.5	V	4.00	22.21	40.71	51.60
801.20	27.2	H	4.00	23.66	54.86	37.45
820.90	26.4	V	4.04	23.70	54.14	38.17
820.90	31.3	H	4.04	24.70	60.04	32.27
820.90	32.0	V	4.04	23.70	59.74	32.57
820.90	35.2	H	4.04	24.70	63.94	28.37

NOTE: The spectrum was scanned to the tenth harmonic. Measurements were made on at least 3 channels.

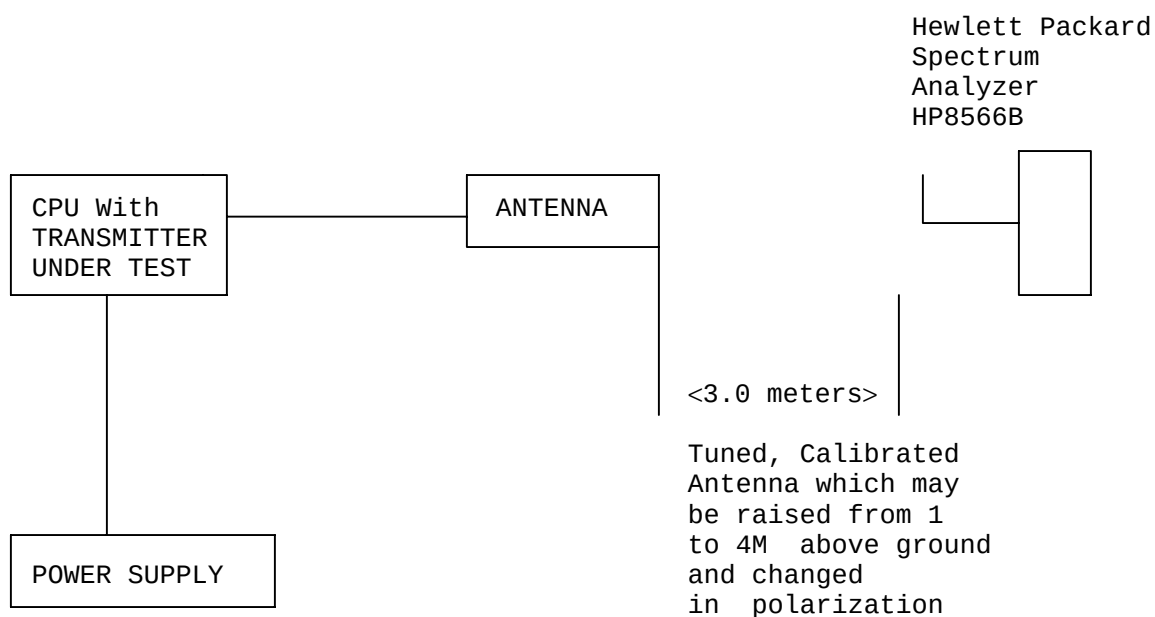
METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD C63.4-1992 & the FCC/OET Guidance on Measurements for Direct Sequence Spread Spectrum Systems - Public Notice 54797 Dated July 12, 1995. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Method of Measuring Radiated Spurious Emissions



Equipment placed 80cm above ground on a rotatable platform.

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE

RULES PART NO.: 15.107

REQUIREMENTS:

	QUASI - PEAK	AVERAGE
.15 - 0.5 MHz	66-56 dBuV	56-46 dBuV
0.5 - 5.0	56	46
5.0 - 30.	60	50

TEST PROCEDURE: ANSI STANDARD C63.4-1992. The spectrum was scanned from .15 to 30 MHz.

TEST DATA:

**THE FOLLOWING GRAPHS REPRESENT THE EMISSIONS READ FOR
POWERLINE CONDUCTED FOR THIS DEVICE.**

TEST RESULTS: Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

PERFORMED BY: JOSEPH SCOGLIO

DATE: SEPTEMBER 19, 2003

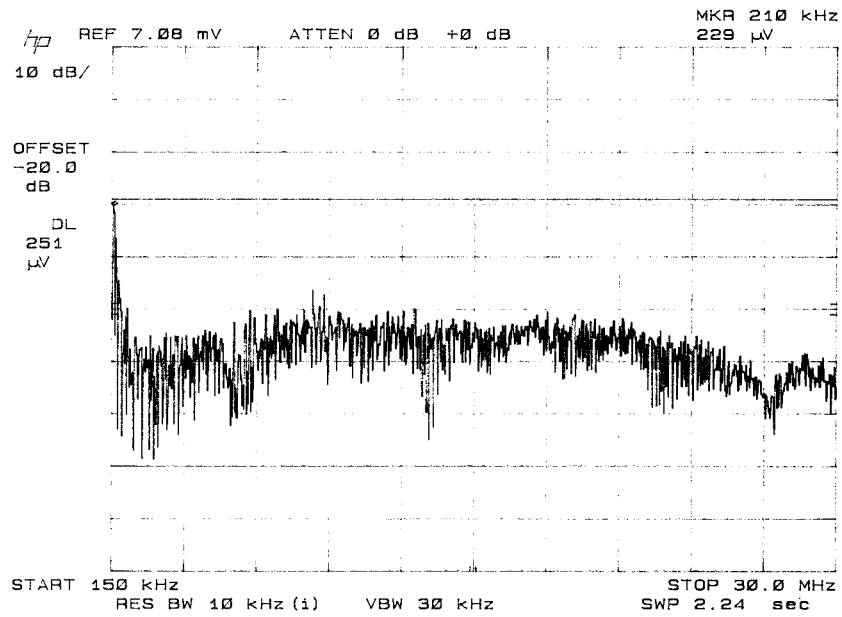
APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

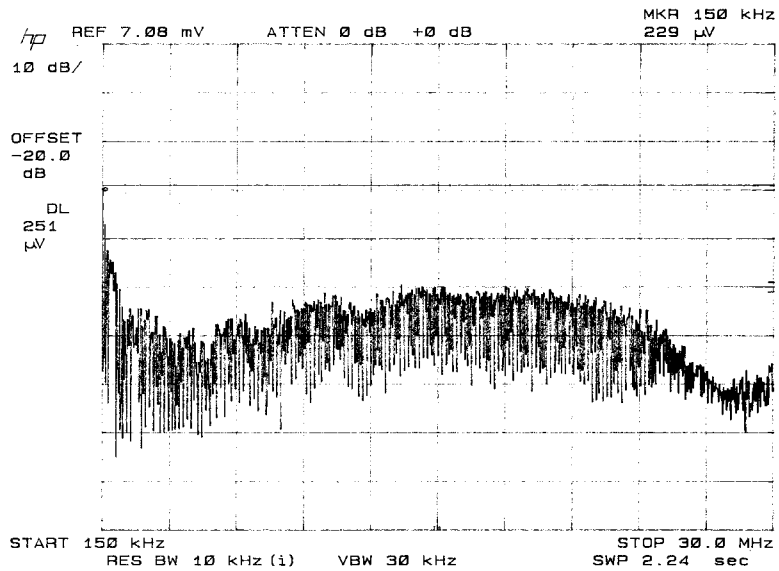
REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 10 of 16

LINE 1



LINE 2



APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 11 of 16

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

NAME OF TEST: RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

REQUIREMENTS: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54 dBuV/m).

TEST PROCEDURE: An in band field strength measurement of the fundamental Emission using the RBW and detector function required by C63.4-2000 and FCC Rules. The procedure was repeated with an average detector and a plot made. The calculated field strength in the adjacent restricted band is presented below.

Average
CHANNEL 1
FREQUENCY: 2389.99 MHz
- 1.78 dBuV from plot
+29.22 dB ACF
+ 3.31 dB Coax Loss
+20.00 dB Attn. Pad
+50.75 dbuV

Average
CHANNEL 11
FREQUENCY: 2483.66 MHz
- 1.28 dBuV from plot
+29.37 dB ACF
+ 3.39 dB Coax Loss
+20.00 dB Attn. Pad
+51.48 dBuV

Peak

CHANNEL 1
FREQUENCY: 2390.06 MHz
+ 9.4 dBuV from plot
+29.22 dB ACF
+ 3.31 dB Coax Loss
+20.00 dB Attn. Pad
+61.93 dbuV

Peak

CHANNEL 11
FREQUENCY: 2485.48 MHz
+ 9.4 dBuV from plot
+29.37 dB ACF
+ 3.39 dB Coax Loss
+20.00 dB Attn. Pad
+62.16 dBuV

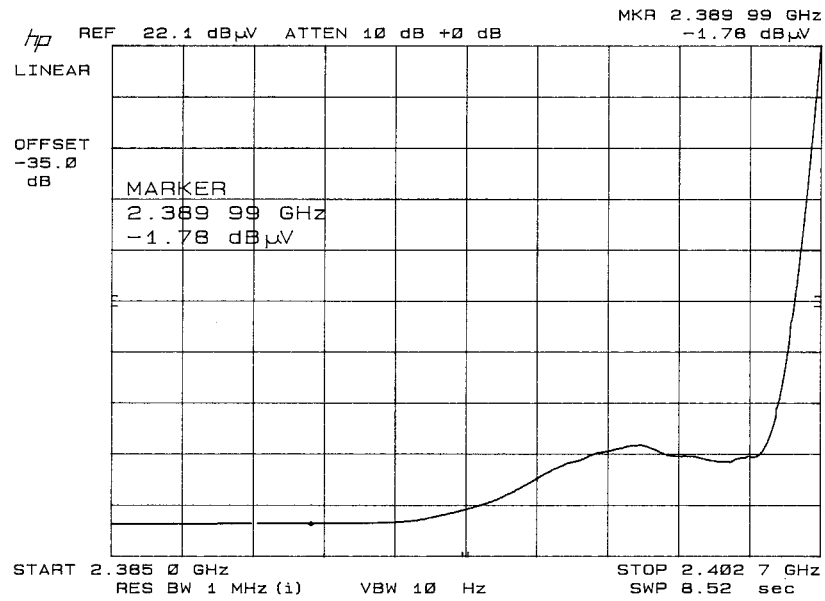
APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

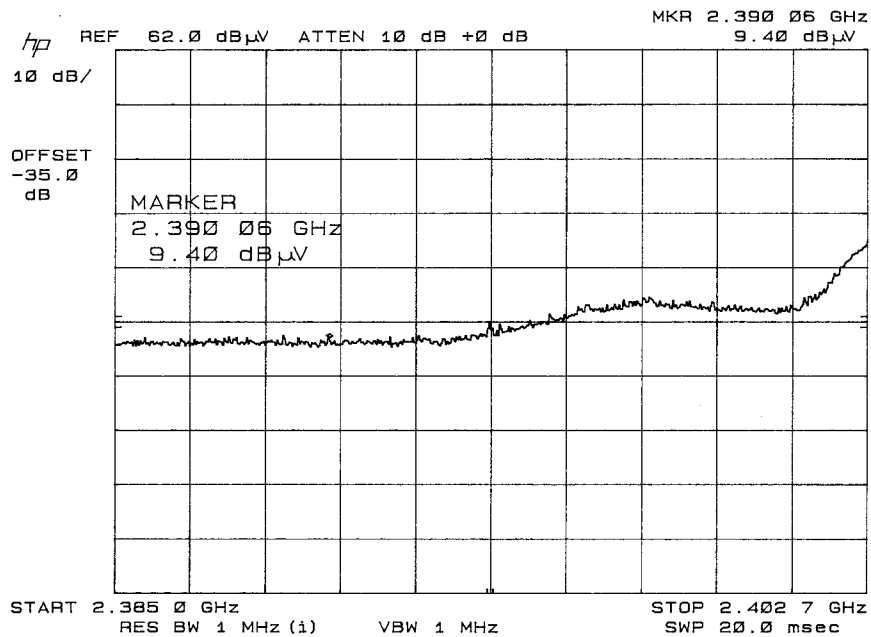
REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 12 of 16

**BAND EDGE PLOT 1
CHANNEL 1
AVERAGE**



**BAND EDGE PLOT 2
CHANNEL 1
PEAK**



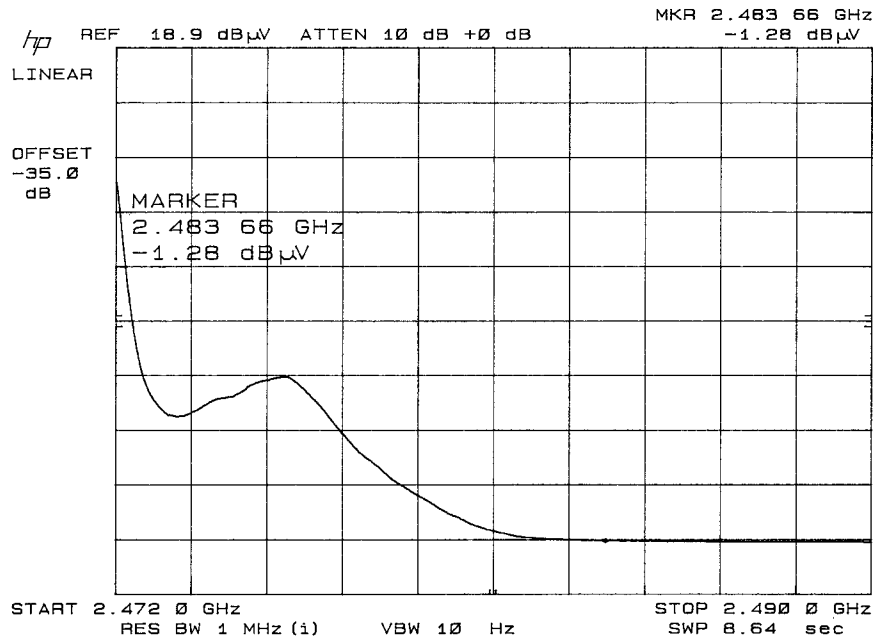
APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

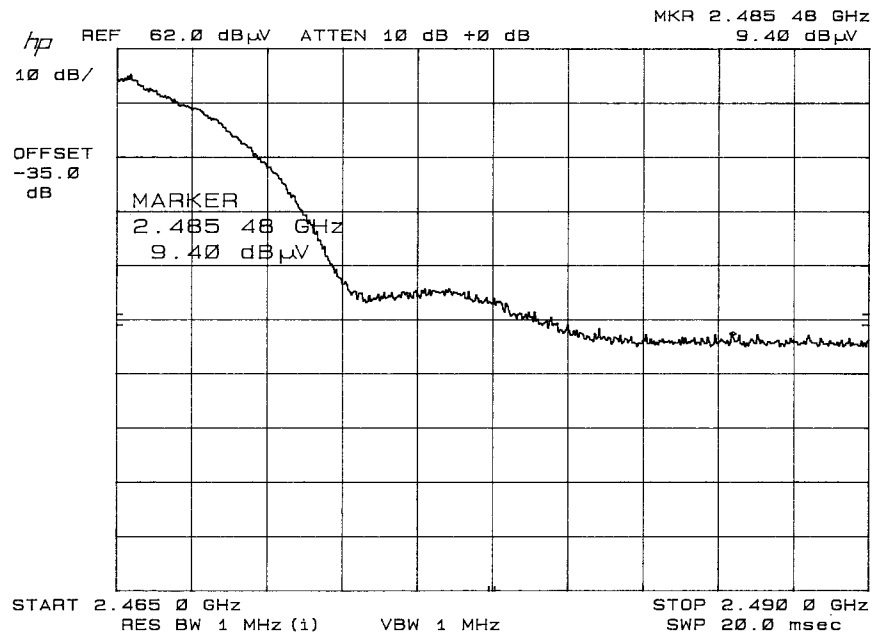
REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 13 of 16

BAND EDGE PLOT 3 **CHANNEL 11** **AVERAGE**



BAND EDGE PLOT 4 **CHANNEL 11** **PEAK**



APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 14 of 16

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

NAME OF TEST: POWER SPECTRAL DENSITY

RULES PART NO.: 15.247(d)

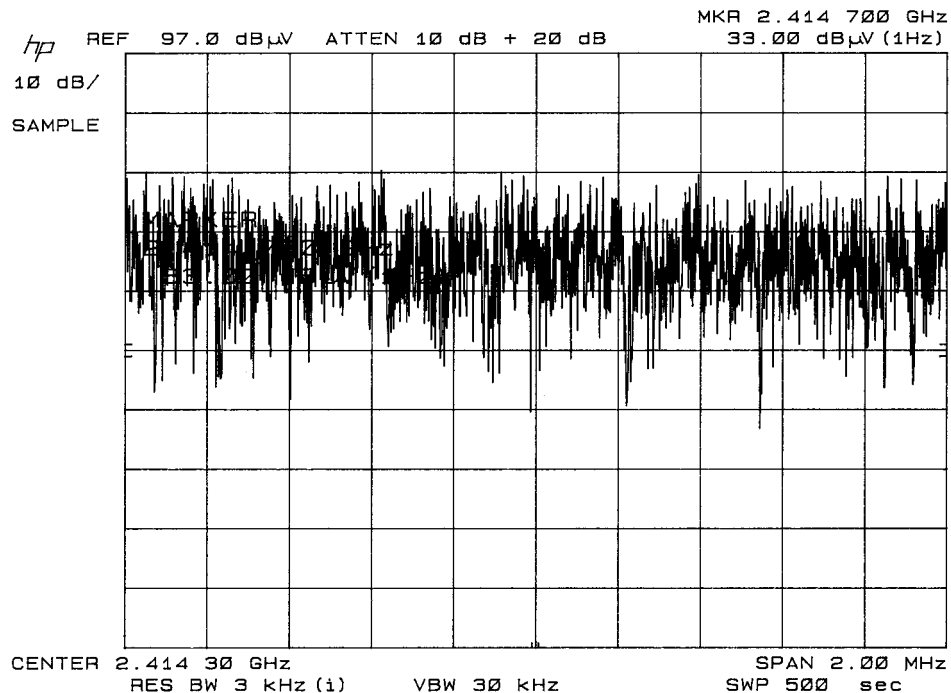
REQUIREMENTS: The peak level measured must be no greater than +8.0dBm.

DATA: THE PLOT IS SHOWN IN EXHIBITS #8.

The level at 2432.94 MHz was 33.00 dBuV.

33.00	
+20 dB	Attn.
+35 dB	Correction Factor
88 dBuV	
-107	
-19 dBm	

NOTE: Measurements were made on 3 channels and the worst case is presented above.



APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00002

REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 15 of 16

MPE CALCULATION

For a device with:

output power :21.2 dBm

Antenna gain of: 2.15 dBi

For all frequencies above 1500 MHz(see OET 65): S=1

W := 0.133 power in Watts D := 1 Duty Factor in decimal % (1=100%)

E := 30.0 exposure time in minutes U := 30 (use 6 for controlled and 30 for uncontrolled)

$$W_{exp} := W \cdot D \cdot \left(\frac{E}{U} \right)$$

$$PC := \frac{E}{U}$$

PC = 1 percent on time

Wexp = 0.133 Watts

Po := 133 mWatts dBd := 1 antenna gain f := 1500 Frequency in MHz

G := dBd + 2.15 gain in dBi

Gn := $10^{\frac{G}{10}}$ gain numeric S := $\frac{f}{1500}$ controlled exposure

300 for controlled

Gn = 2.065 S = 1 1500 for uncontrolled

$$R := \sqrt{\frac{(Po \cdot Gn)}{(4 \cdot \pi \cdot S)}}$$

$$R_{inches} := \frac{R}{2.54}$$

R = 4.675 distance in centimeters
required for compliance

Rinches = 1.841

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REPORT #: P\PARKERJFE\1467BUT3\1467BUT3TestReport.doc

Page 16 of 16