

# TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: [sid@timcoengr.com](mailto:sid@timcoengr.com)



## Test Report

Product Name: WIRELESS LAN

FCC ID: JFE-D2D00003

Applicant:

**PARKERVISION INC.  
8493 BAYMEADOWS WAY  
JACKSONVILLE, FL 32256**

**Date Receipt: FEBRUARY 26, 2004**

**Date Tested: MARCH 2, 2004**

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00003

REPORT #: P\PARKERJFE\236AUT4\236AUT4TestReport.doc

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### EXHIBITS INCLUDED:

REQUEST FOR CONFIDENTIALITY LETTER  
BLOCK DIAGRAM  
SCHEMATICS  
USERS MANUAL  
LABEL SAMPLE  
LABEL LOCATION  
EXTERNAL PHOTOGRAPHS  
INTERNAL PHOTOGRAPHS  
OPERATIONAL DESCRIPTION  
TEST SET UP PHOTOGRAPHS

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MARCH 2, 2004

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

SUBJECT: PARKERVISION INC.

FCC ID: JFE-D2D00003

To Whom It May Concern:

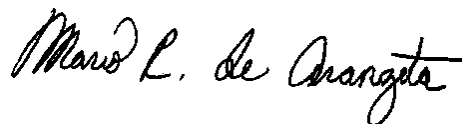
The attached application is for a direct sequence spread spectrum wireless router.

This system has only one type of antenna, permanently attached dipoles with a gain of 2dBi.

PARKERVISION INC. purchases standard antennas from the manufacturer.

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.

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## 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

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## TEST PROCEDURE

**GENERAL:** This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

**POWER LINE CONDUCTED INTERFERENCE:** The procedure used was ANSI STANDARD C63.4-2000 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 MHz and the video bandwidth (VBW) =3 MHz 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 10.0MHz and the spectrum was scanned from 30MHz to the 10<sup>th</sup> Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2000 using a HEWLETT PACKARD spectrum analyzer with a pre-selector. The bandwidth (RBW) of the spectrum analyzer was 100 kHz up to 1 GHz and 1 MHz 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%.

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**APPLICANT:** PARKERVISION INC.  
**FCC ID:** JFE-D2D00003  
**NAME OF TEST:** POWER LINE CONDUCTED INTERFERENCE  
**RULES PART NO.:** 15.107(a)

<b>REQUIREMENTS:</b>	<b>QUASI-PEAK</b>	<b>AVERAGE</b>
.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 PLOTS ON THE FOLLOWING PAGES REPRESENT THE EMISSIONS TAKEN 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.

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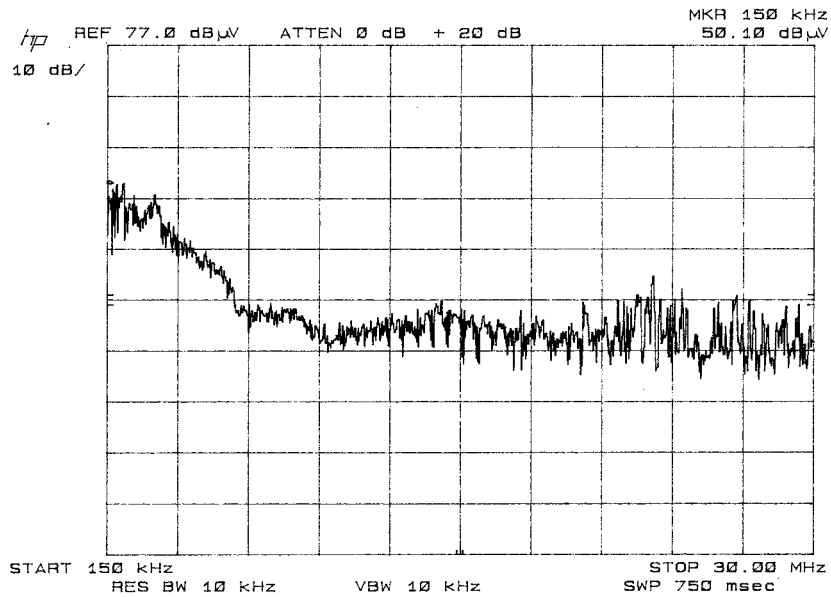
849 NW State Road 45

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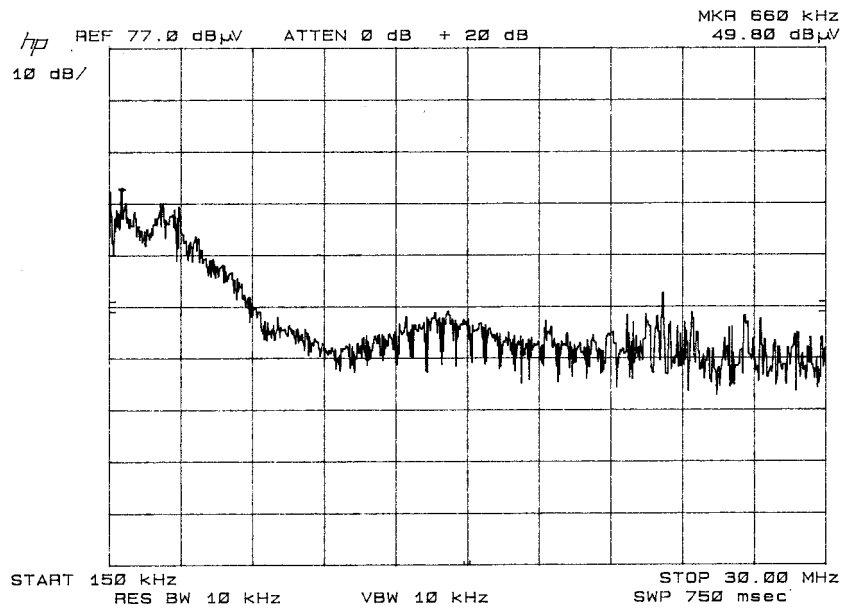
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## POWER LINE CONDUCTED LINE 1



## LINE 2



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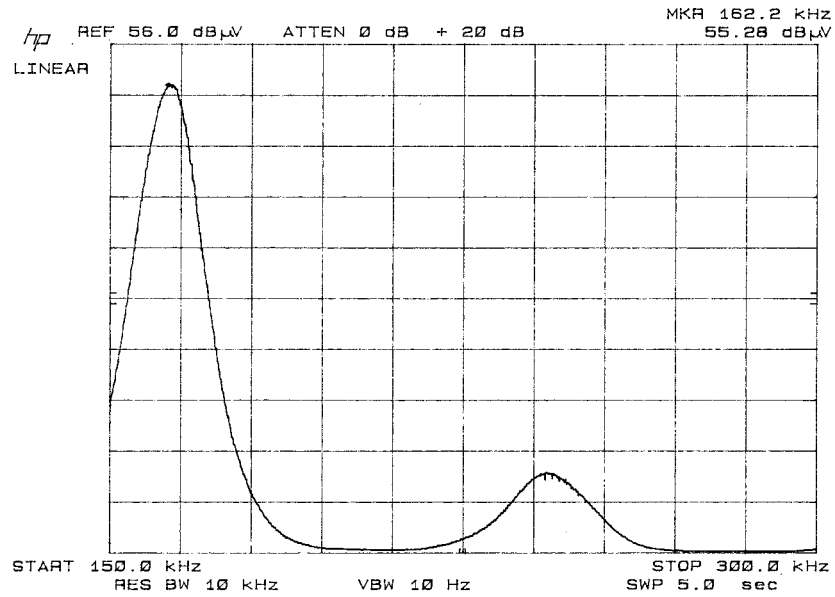
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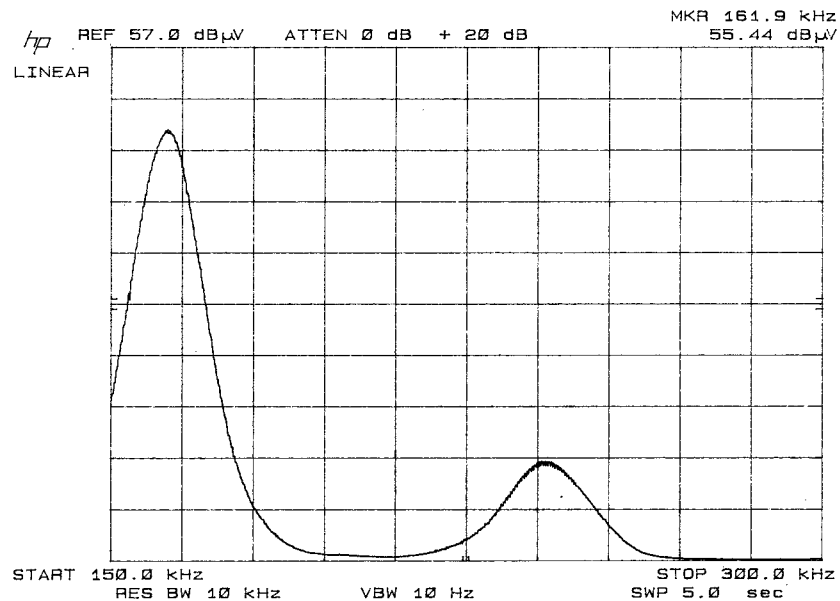
## POWER LINE CONDUCTED

### LINEAR AVERAGING

#### LINE 1



#### LINE 2



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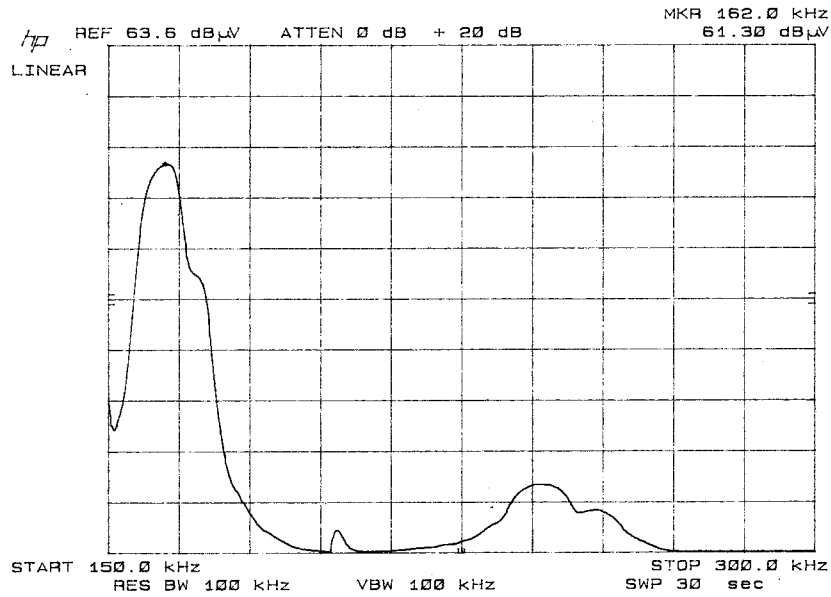
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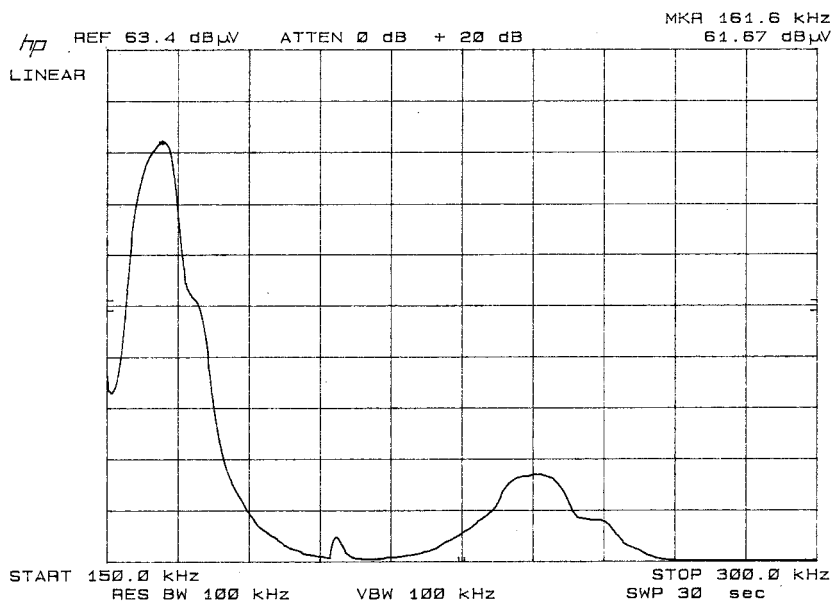
## POWER LINE CONDUCTED

### QUASI PEAK

#### LINE 1



#### LINE 2



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**APPLICANT:** PARKERVISION INC.

**FCC ID:** JFE-D2D00003

**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:** The 6.0dB bandwidth measured @ 2412 MHz was  
10.33 MHz.

## MEASUREMENT

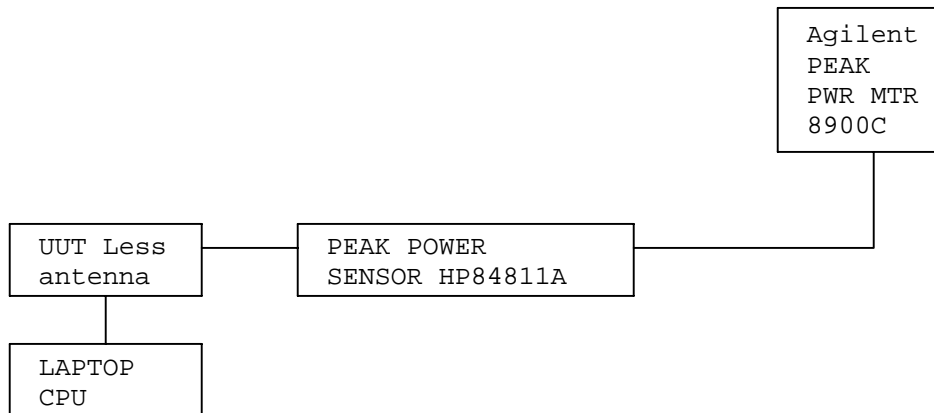
**DATA:** See the following plots

**NAME OF TEST:** POWER OUTPUT

**RULES PART NO.:** 15.247(b) 1.0Watt or +30dBm  
250mW Watts or 24dBm for 24dBi Gain Ant

**MEASUREMENT:** 100 mWatts or 20.0 dBm @ 2412.0MHz

**15.247(c)** Method of Measuring RF Power output: The Peak power Sensor was connected in place of the antenna.



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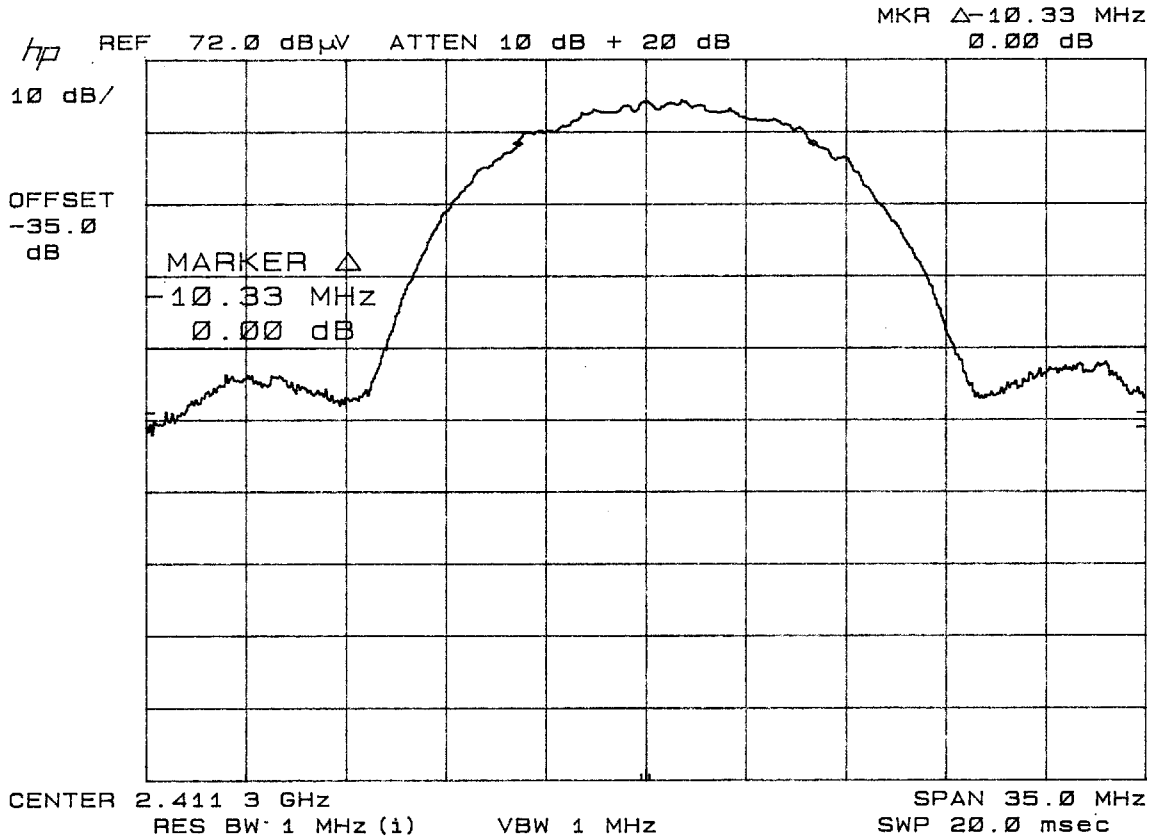
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## 6dB BANDWIDTH PLOT



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**NAME OF TEST:** SPURIOUS EMISSIONS AT ANTENNA TERMINALS

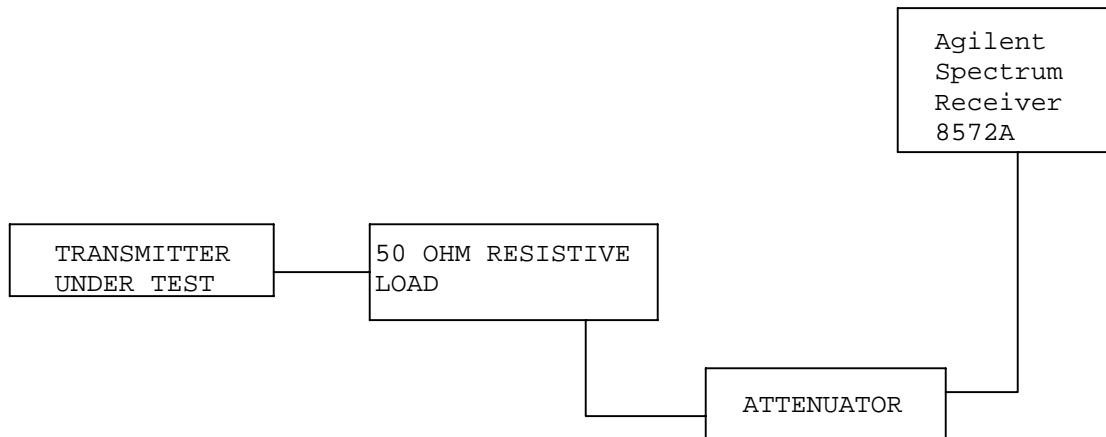
**REQUIREMENTS:** Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

**TEST DATA:**

TF	EF	dB below carrier	TF	EF	dB below carrier
LOW POWER			HIGH POWER		
2412	2412	0.0	2437	1625	105.2
	3216	95.9		2437	0.0
	4824	98.6		3249	94.4
	7236	89.7		4874	98.2
	9648	90.9		6498	107.8
				7311	78.2
				9748	93.6
TF	EF	dB below carrier			
LOW POWER					
2462	1641	100.7			
	2462	0.0			
	3282	92.0			
	4923	94.2			
	7386	71.9			
	9848	96.8			

NOTE: THE SPECTRUM WAS SCANNED TO THE TENTH HARMONIC.

15.247(c) Method of Measuring RF Conducted Spurious Emissions



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

## REQUIREMENTS:

FIELD STRENGTH of Fundamental: 902-928MHz	FIELD STRENGTH of Harmonics	S15.209 30 - 88 MHz 40 dBuV/m @3M 88 -216 MHz 43.5
2.4-2.4835GHz	127.37dBuV/m 54 dBuV/m @3m	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 FOR EMISSIONS THAT FALL IN A RESTRICTED BAND:

FIELD STRENGTH LIMITS FOR PEAK READINGS: 74 dBuV/m  
FIELD STRENGTH LIMITS FOR AVERAGE READINGS: 54 dBuV/m

## TEST DATA:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
2,412.0	1,608.00	20.5	V	1.50	27.29	49.29	4.71
2,412.0	2,412.00	83.4	V	1.91	29.28	114.59	12.78
2,412.0	3,216.00	15.4	V	2.16	30.93	48.49	5.51
2,412.0	4,824.00R	16.4	V	2.65	34.04	53.09AV	0.91
2,412.0	4,824.00R	28.1	V	2.65	34.04	64.79PK	9.21
2,412.0	7,238.00	10.1	V	3.37	36.66	50.13	44.46
2,412.0	7,238.00	19.6	V	3.37	36.66	59.63	34.90
2,412.0	9,647.00	16.8	V	3.86	38.69	59.35	35.24
2,412.0	9,647.00	22.9	V	3.86	38.69	65.45	29.14
2,437.0	1,624.60R	20.1	V	1.51	27.35	48.96	5.04
2,437.0	2,437.00	82.9	V	1.92	29.31	114.13	13.24
2,437.0	3,249.00	17.1	V	2.17	31.00	50.27	43.86
2,437.0	4,874.00R	15.3	V	2.66	34.20	52.16AV	1.84
2,437.0	4,874.00R	24.2	V	2.66	34.20	61.06PK	12.94
2,437.0	7,311.00R	10.7	V	3.39	36.61	50.70AV	3.30
2,437.0	7,311.00R	22.1	V	3.39	36.61	62.10PK	11.90
2,437.0	9,748.00	13.7	V	3.87	38.90	56.47	37.66
2,437.0	9,748.00	23.7	V	3.87	38.90	66.47	27.66
2,462.0	1,641.30	19.6	V	1.52	27.41	48.53	45.05
2,462.0	2,462.00	82.3	V	1.93	29.35	113.58	13.79
2,462.0	3,282.00	14.2	V	2.18	31.06	47.44	46.14
2,462.0	3,282.00	16.3	V	2.18	31.06	49.54	44.04
2,462.0	4,923.00R	25.6	V	2.68	34.35	62.63PK	11.37
2,462.0	4,924.00R	14.4	V	2.68	34.36	51.44AV	2.56
2,462.0	9,848.00	11.4	V	3.88	39.10	54.38	39.20
2,462.0	9,848.00	17.6	V	3.88	39.10	60.58	33.00

Note: the spectrum was scanned to the tenth harmonic

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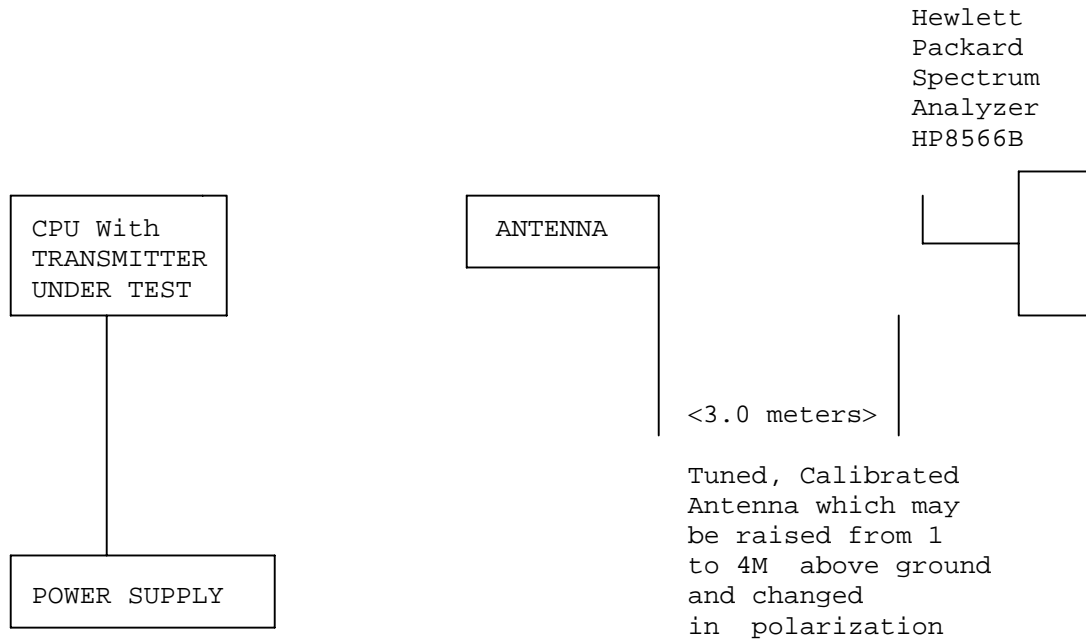
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## Method of Measuring Radiated Spurious Emissions



Equipment placed 80cm above ground on a rotatable platform.

**METHOD OF MEASUREMENT:** The procedure used was ANSI STANDARD C63.4-2000 and 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.

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**APPLICANT:** PARKERVISION INC.

**FCC ID:** JFE-D2D00003

**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: 2381.00 MHz  
+ 1.80 dBuV from plot  
+29.23 dB ACF  
+ 1.89 dB Coax Loss  
+20.00 dB Attn. Pad  
+52.92 dBuV

Average

CHANNEL 11  
FREQUENCY: 2483.50 MHz  
- 0.50 dBuV from plot  
+29.38 dB ACF  
+ 1.94 dB Coax Loss  
+20.00 dB Attn. Pad  
+50.82 dBuV

Peak

CHANNEL 1  
FREQUENCY: 2381.00 MHz  
+12.10 dBuV from plot  
+29.23 dB ACF  
+ 1.89 dB Coax Loss  
+20.00 dB Attn. Pad  
+63.22 dBuV

Peak

CHANNEL 11  
FREQUENCY: 2483.50 MHz  
+12.10 dBuV from plot  
+29.38 dB ACF  
+ 1.94 dB Coax Loss  
+20.00 dB Attn. Pad  
+63.42 dBuV

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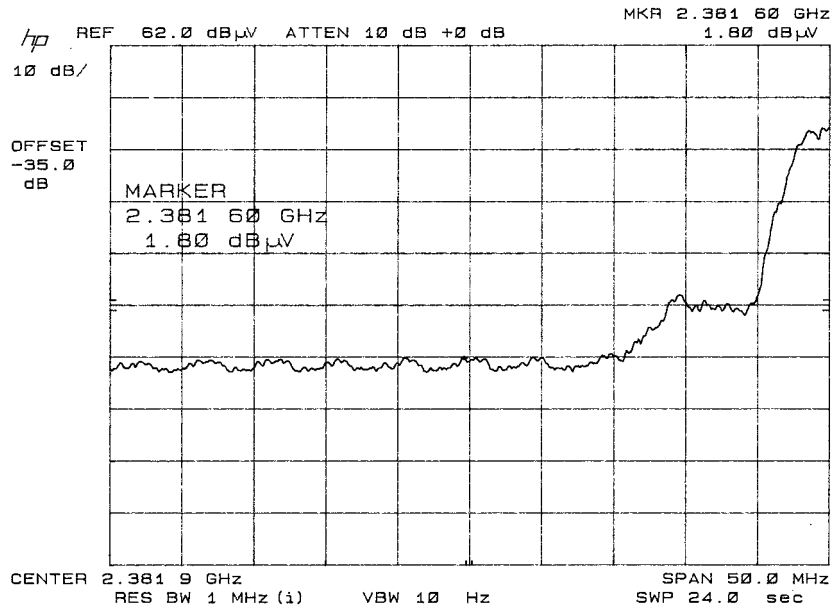
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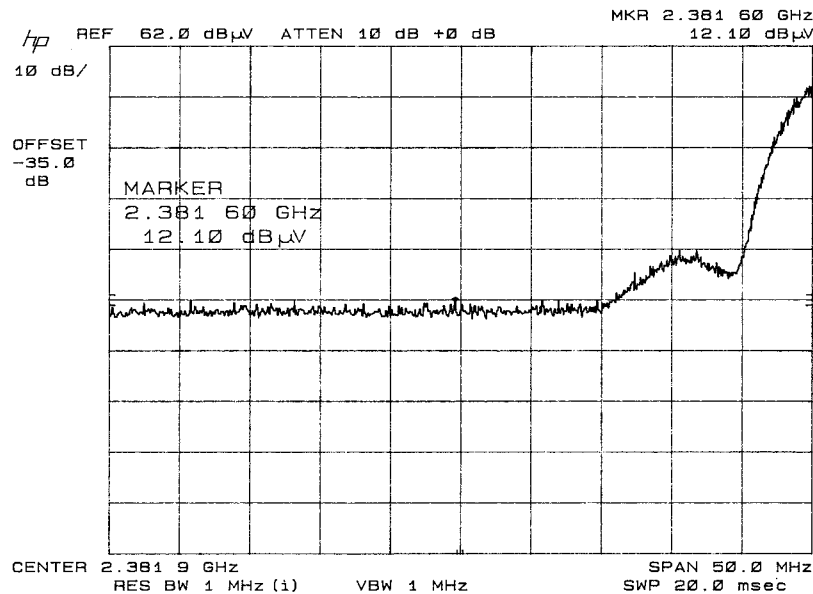
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## AVERAGE - CHANNEL 1



## PEAK - CHANNEL 1



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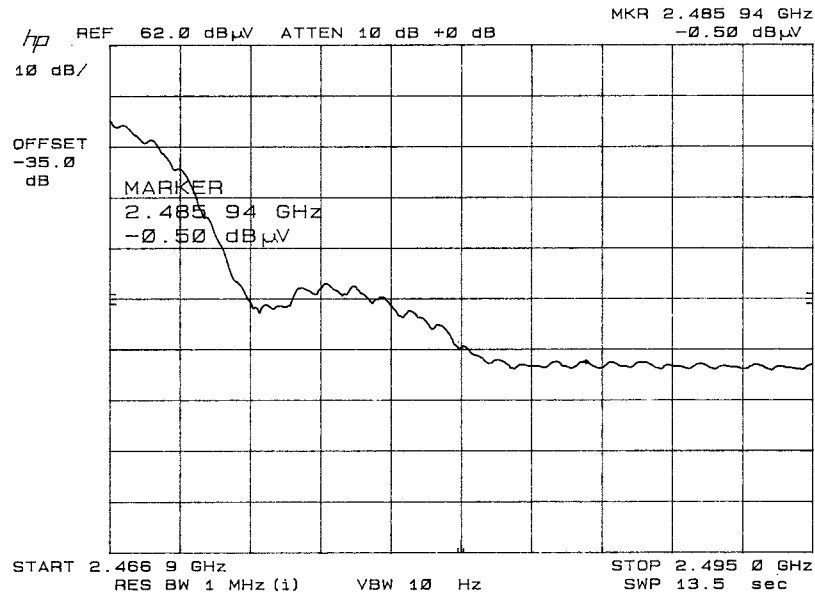
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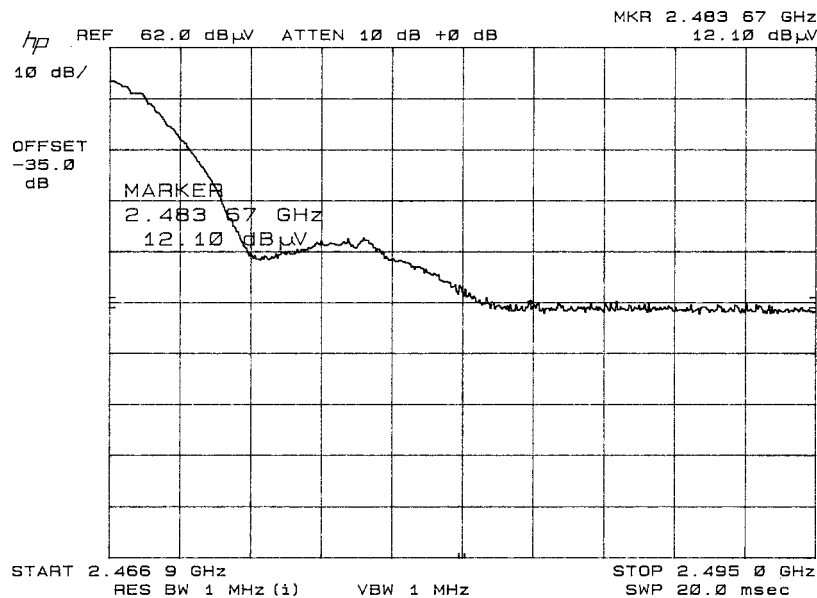
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## AVERAGE - CHANNEL 11



## PEAK - CHANNEL 11



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