

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



Test Report

Product Name: WIRELESS ROUTER

FCC ID: JFE-D2D00003

Applicant:

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

Date Receipt: JUNE 21, 2004

Date Tested: JULY 23, 2004

APPLICANT: PARKERVISION INC.

FCC ID: JFE-D2D00003

REPORT #: P\PARKERJFE\914UT4\914UT4TestReport.doc

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REQUEST FOR CONFIDENTIALITY LETTER
EXTERNAL PHOTOGRAPHS
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13 July 2004

Federal Communications Commission
7435 Oakland Mills Road
Columbia MD 21046

Subject: Class II Permissive Change FCC ID: JFE-D2D00003

Whom It May Concern:

Parts obsolescents and need for a system improvement to increase the temperature range required several changes to the radio. We request a permissive change for the following:

- 1) Replace an obsolete LNA Infineon BGA622 (U30, U33) with the Hittite HMC286. Both parts are similar in gain and noise figure. Since the LNA is located in the receive channel, it does not effect the transmit spectrum or contribute to spurious emissions.
- 2) A system improvement of: The discrete power-on-reset circuit (D2, C114) was replaced by an integrated circuit U23. Also, R55 changed from 10K to 100K. The purpose was to reduce timing variances when the base band processor (U18) is reset. This allows for a more reliable processor to host communication over a greater temperature range. This change doesn't effect the transmit spectrum or produce unwanted emissions.
- 3) A system improvement of: Two plated-thru connector mounting holes were added to accommodate a different style PCMICA connector. This is a passive change and doesn't effect the transmit spectrum or contribute to spurious emissions.
- 4) A system improvement of: The 3.3 Volt regulator (U16, AME8805AEFT) was replaced with a 3.5 Volt regulator (AME8805GEFT). The extra 0.2 Volt increase compensates for the voltage drop thru the power filter (L9). The voltage level at the modulator/ demodulator IC (U15, U8) is set at the desired design level. Emission tests shows no effect on the transmit spectrum or increase in spurious emissions.
- 5) A system improvement of: The synthesizer recalibration circuit (R105, C233, U34) was added. During a temperature change (an increase or decrease from initial power up temperature), the synthesizer (U7, Si4113) can lose frequency lock. The added circuit monitors the synthesizer lock or near-loss-of- lock output pin (U7.12). If a near-loss-of-lock condition occurs, the circuit briefly powers down the synthesizer (U7.13). Then re-power the synthesizer, thus recalibrating it at the new temperature. This change doesn't effect the transmit spectrum or produce any additional spurious emissions.

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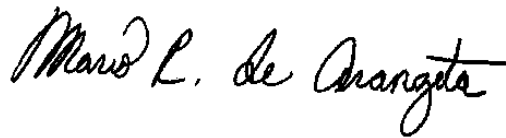
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- 6) A system improvement of: The synthesizer output match has been changed to increase the drive level of the up and down conversion process (U15.68, U8.68, U8.23). This increases the reliability over a greater temperature range. The change consists of removing resistor R61 and replacing inductor L142 with a 200 ohm resistor. In addition, change the power splitter by replacing R7 with a zero ohms and replacing R6 and R8 with a 3.9nH inductor. The benefit is synthesizer output is frequency match to the load and suppresses the fundamental harmonics of the LO.

The radio board with the above changes has successfully tested for compliance with FCC Part 15 rules. A copy of the radiated spurious emissions data is included on subsequent pages.

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	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/12/06
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
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
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

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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 C63.4-1992 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=100kHz, VBW=300kHz and the span set to 10.0MHz and the spectrum was scanned from 30MHz to the 10th Harmonic of the fundamental. Above 1.0GHz the resolution bandwidth was 1.0MHz and the VBW = 3.0MHz and the span to 50MHz.

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 76°F with a humidity of 55%.

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

REQUIREMENTS:

FIELD STRENGTH of Fundamental:	FIELD STRENGTH of Harmonics	S15.209
902-928MHz		30 - 88 MHz 40 dBuV/m @3M
2.4-2.4835GHz	127.37dBuV/m	88 -216 MHz 43.5
	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:

Emission Frequency MHz		Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
PEAK							
2,411.80		84.8	V	1.86	29.28	115.94	11.43
4,823.70	R	19.5	H	2.65	34.14	56.29	17.71
4,823.70	R	30.1	V	2.65	34.04	66.79	7.21
7,235.50	R	13.8	H	3.35	36.85	54.00	20.00
7,235.50	R	22.7	V	3.35	36.66	62.71	11.29
9,647.40		22.5	V	3.93	38.69	65.12	30.82
2,436.30		84.1	V	1.87	29.31	115.28	12.09
4,873.80	R	16.5	H	2.66	34.30	53.46	20.54
4,873.80	R	24.0	V	2.66	34.20	60.86	13.14
7,210.10		17.1	V	3.34	36.67	57.11	38.17
9,748.00		17.3	V	3.95	38.90	60.15	35.14
2,462.00		82.3	V	1.88	29.35	113.53	13.84
4,924.10	R	18.4	H	2.68	34.46	55.54	18.46
4,924.10	R	24.5	V	2.68	34.36	61.54	12.46
7,386.10	R	17.3	H	3.38	36.82	57.50	16.50
7,386.10	R	20.1	V	3.38	36.57	60.05	13.95
9,848.20		13.0	V	3.97	39.10	56.07	37.46
AVERAGE							
4,823.70		13.7	V	2.65	34.04	50.39	3.61
7,235.50		8.4	V	3.35	36.66	48.41	5.59
4,873.80		11.3	V	2.66	34.20	48.16	5.84
7,310.10		5.7	V	3.36	36.61	45.67	8.33
4,924.10		13.6	V	2.68	34.36	50.64	3.36
7,386.10		8.6	V	3.38	36.57	48.55	5.45

Harmonics were checked through the 10th harmonic

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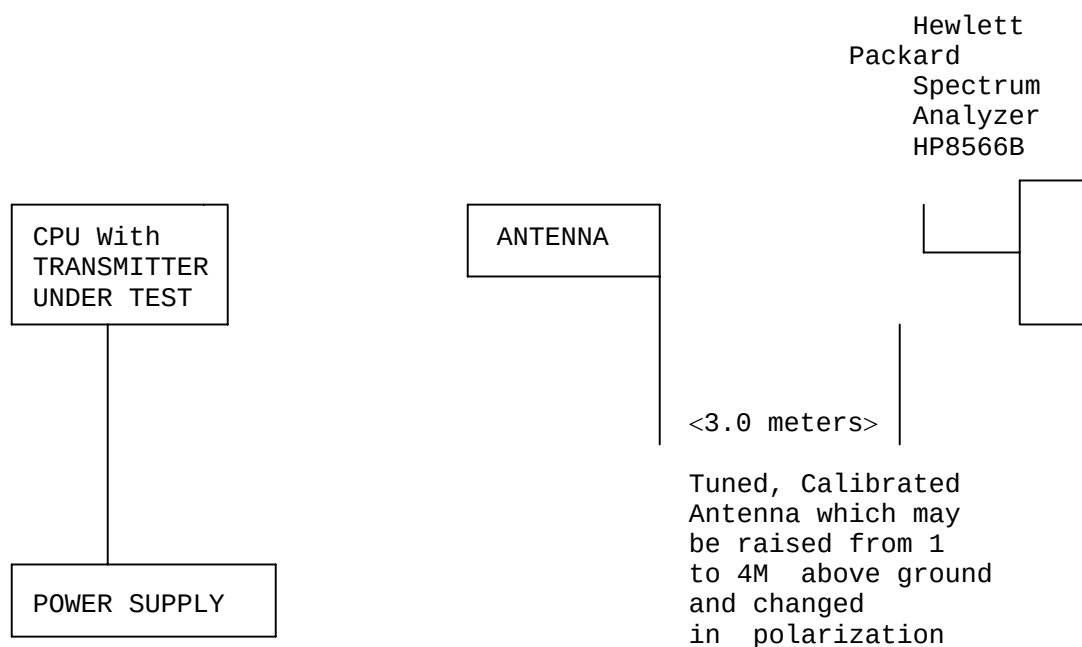
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Method of Measuring Radiated Spurious Emissions



Equipment placed 80cm above ground on a rotatable platform.

METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD C63.4-1992 & 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.

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