APPLICANT	Manufacturer
Knogo North America 350 Wireless Boulevard Hauppauge, NY 11788	Knogo North America 350 Wireless Boulevard Hauppauge, NY 11788

TEST SPECIFICATION: FCC Rules and Regulations Part 15, Subpart C

TEST SAMPLE DESCRIPTION

BRANDNAME: Knogo

MODEL: 2MHz Wrap Desk FCC ID:

TYPE: Pulsed Transmitter

FREQUENCY RANGE: 2 MHz (Operated in the 1.705 to 10 MHz Band)

POWER REQUIREMENTS: 18VDC derived from 115VAC, 60 Hz AC Adapter

TESTS PERFORMED

- 15.207(a) Conducted Emissions
- 15.223(a) Radiated Emissions, Fundamental
- 15.223(B) Occupied Bandwidth
- 15.223(b) Radiated Emissions, Spurious Case
- 15335(b) Duty Cycle Determination

REPORT OF MEASUREMENTS

Applicant: Knogo North America

Device: Pulsed Transmitter

FCC ID:

Power Requirements: 18VDC derived from an AC Adapter

Applicable Rule Section: Part 15, Subpart C, Section 15.223

TEST RESULTS

15.207(a): The radio frequency voltage that was conducted back on to the AC power line on any frequency/frequencies within the bandwidth of 450kHz to 30MHz did not exceed 250 microvolts.

15.223(a): Field strength of emissions from the intentional radiator operating in the 1.705 - 10 MHz frequency band did not exceed 15 uV/m at 30 meters (average) for the fundamental. The 6dB bandwidth of the emission was less than 10% of the center frequency.

15.223(b): Field strength of emissions outside of the band 1.705 - 10 MHz did not exceed the general radiated emissions limits of 15.209.

GENERAL NOTES

1. All user accessible controls were adjusted to produce maximum emissions.

2. Measurements of conducted emissions were performed utilizing a 50 ohm/50µhenry Line Impedance Stabilization Network (LISN).

3. The unit operated at single frequency centered at 2 MHz.

4. The frequency range was scanned from 1.705 MHz to 1 GHz. All emissions not reported were more than 20dB below the specified limit.

DETERMINATION OF DUTY CYCLE

The unit's RF output was directly coupled to the input of the spectrum analyzer. The analyzer was set for a frequency span of 0Hz. The sweep time was then adjusted in order to display one full pulse train. The transmitter on time was then summed and compared to the time for one full cycle in order to obtain the duty cycle. (See plots for additional information)

Transmitter On Time	=	336 microseconds (maximum- worst case in 100 ms)
Transmitter Cycle Time	=	16.67 milliseconds
Transmitter Duty Cycle	=	0.336 % (- 49.4 dB)

SPECTRUM ANALYZER DESENSITIZATION CONSIDERATIONS

Due to the nature of the emissions being measured, care was taken to ensure that the resolution bandwidth of the spectrum analyzer was adequate to provide accurate measurements. The following formula was utilized:

Setting pulse desensitization equal to zero and utilizing the minimum observed pulse width of 7.0µs yields a minimum required bandwidth of 104,657 Hz. FCC specified bandwidths of 10 kHz below 30 MHz and 100kHz and 1MHz were utilized below and above 1GHz, respectively. For measurements below 30 MHz a pulsewidth desensitization factor of -19.6 dB was applied, derived from the following formula:

P[dB] = 20 log (pulse width x bandwidth x1.5)

Where pulse width = 7.0 microseconds and bandwidth = 10 kHz

P[dB] = - 19.6 dB

EXHIBIT 4

Radiated Emissions

Para. 15.223(a)
Para. 15.223(b)

(Please see separate e-file attachment named ReFund.pdf and ReSpur.pdf)

EXHIBIT 4

Occupied Bandwidth

Para. 15.223(b)
(Please see separate e-file attachment named OccBw.pdf)

EXHIBIT 4

Duty Cycle

Para. 15.35(b)
(Please see separate e-file attachment named Dutycycle.pdf)

EXHIBIT 4

Conducted Emissions

Para. 15.107(a)
(Please see separate e-file attachment named CeData.pdf)

EQUIPMENT LISTS

FCC15.207(a) Conducted Emissions, 450kHz to 30MHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
078	LISN	Solar Electronics	10 kHz - 30 MHz	8028-50-TS24BNC	04/27/2000	04/27/2001
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	02/20/2001	08/20/2001
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/05/2001	03/05/2002
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	02/20/2001	08/20/2001
202	Transient Limiter	Hewlett Packard	.009 MHz - 200 MHz	11947A	07/24/2000	07/24/2001
513	LISN	Solar Electronics	10 kHz - 30 MHz	8028-50-TS24BNC	04/27/2000	04/27/2001
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	02/27/2001	02/27/2002

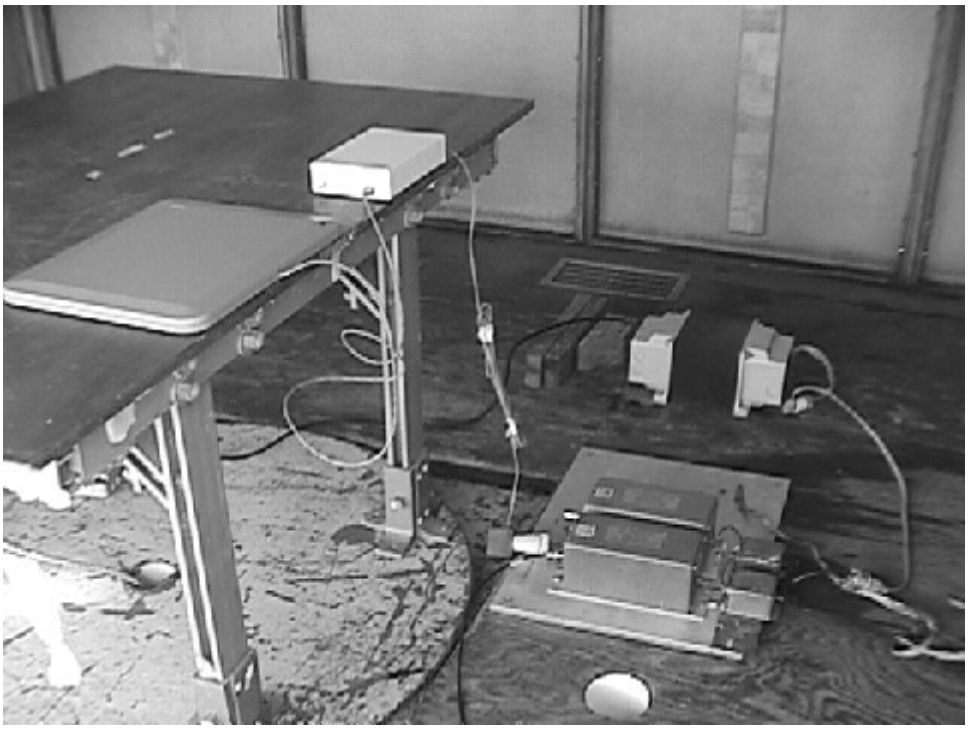
FCC15.223 Radiated Emissions Fundamental Frequency, 1.705MHz to 10MHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
012	Loop Antenna, Active	EMCO	9 kHz - 30 MHz	6502	10/3/00	10/3/01
067	Open Area Test Site	Retlif	3 Meter	RNY	9/20/00	9/20/03
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	6/13/00	6/13/01
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	2/20/01	8/20/01
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	3/5/01	3/5/02
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	2/20/01	8/20/01
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	6/13/00	6/13/01
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	2/27/01	2/27/02

FCC15.223 Radiated Emissions, 1.705MHz to 1.0GHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
012	Loop Antenna, Active	EMCO	9 kHz - 30 MHz	6502	10/3/00	10/3/01
067	Open Area Test Site	Retlif	3 Meter	RNY	9/20/00	9/20/03
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	6/13/00	6/13/01
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	2/20/01	8/20/01
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	3/5/01	3/5/02
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	2/20/01	8/20/01
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	6/13/00	6/13/01
523	Biconilog	Electro-Mechanics	26 - 2000 MHz	3142B	6/8/00	6/8/01
617	Interference Analyzer	Electro-Metrics	10 kHz - 1 GHz	EMC-30	2/27/01	2/27/02

Test Setup Photographs
Conduct Emissions



Radiated Emissions