

**KTL Test Report:** 8R01143.1

**Applicant:** Bang & Olufsen Telecom A/S  
Kjeldsmarkvej 1  
DK-7600  
Struer, Denmark

**Equipment Under Test:** 2.4 GHz Cordless Telephone  
**(E.U.T.)**

**FCC ID:** OIPBEOCOM6000

**In Accordance With:** **FCC Part 15, Subpart C**  
Frequency Hopping Transmitters  
2400 - 2483.5 MHz

**Tested By:** KTL Ottawa Inc.  
3325 River Road, R.R. 5  
Ottawa, Ontario K1V 1H2

**Authorized By:**   
T. Tidwell, Laboratory Manager

**Date:** 13 APRIL, 1999

**Total Number of Pages:** 57

*EQUIPMENT: 2.4 GHz Cordless Telephone*

*FCC ID: OIPBEOCOM6000*

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EQUIPMENT: 2.4 GHz Cordless Telephone  
FCC ID: OIPBEOCOM6000

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## Section 1. Summary of Test Results

Manufacturer: Bang & Olufsen

Model No.: Beocom 6000

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 for Frequency Hopping Spread Spectrum devices. Radiated tests were conducted in accordance with ANSI C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

<input checked="" type="checkbox"/>	New Submission	<input checked="" type="checkbox"/>	Production Unit			
<input type="checkbox"/>	Class II Permissive Change	<input type="checkbox"/>	Pre-Production Unit			
<table><tr><td>D</td><td>S</td><td>S</td></tr></table>	D	S	S	Equipment Code	<input type="checkbox"/>	Family Listing
D	S	S				

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".



**NVLAP LAB CODE: 100351-0**

TESTED BY: Kevin Carr DATE: 13 APR 99  
Kevin Carr, Technologist

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EQUIPMENT: 2.4 GHz Cordless Telephone

FCC ID: OIPBEOCOM6000

**Summary Of Test Data**

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
Powerline Conducted Emissions	15.207(a)	48 dB $\mu$ V	Chart	Complies
Channel Separation	15.247(a)(1)	Greater of 25 kHz or 20 dB Bandwidth	Customer Supplied Data	Complies
Pseudorandom Hopping Algorithm	15.247(a)(1)		Customer Supplied Data	Complies
Time of Occupancy	15.247(a)(1)(ii)	$\leq 0.4$ sec in 30 sec	Plots	Complies
20 dB Occupied Bandwidth	15.247(a)(1)	$\leq 1$ MHz	Plots	Complies
Peak Power Output	15.247(b)	1 Watt	Chart	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	-20 dBc	Plots	Complies
Spurious Emissions (Radiated)	15.247(c)	Table 15.209(a)	Chart	Complies

**Footnotes For N/A's:****Test Conditions:**

**Indoor**                    Temperature: 23 °C  
                                   Humidity: 20 %

**Outdoor**                    Temperature: 10 °C  
                                   Humidity: 20 %

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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## **Section 2.      Equipment Under Test (E.U.T.)**

### **General Equipment Information**

**Frequency Range:**                            2400 – 2483.5 GHz

**Tunable Bands:**                            1

**Number of Channels:**                    79

**Channel Spacing:**                            1.005382 MHz

**Emissions Designator:**                    983KF1D

**User Frequency Adjustment:**            None, Software Controlled

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FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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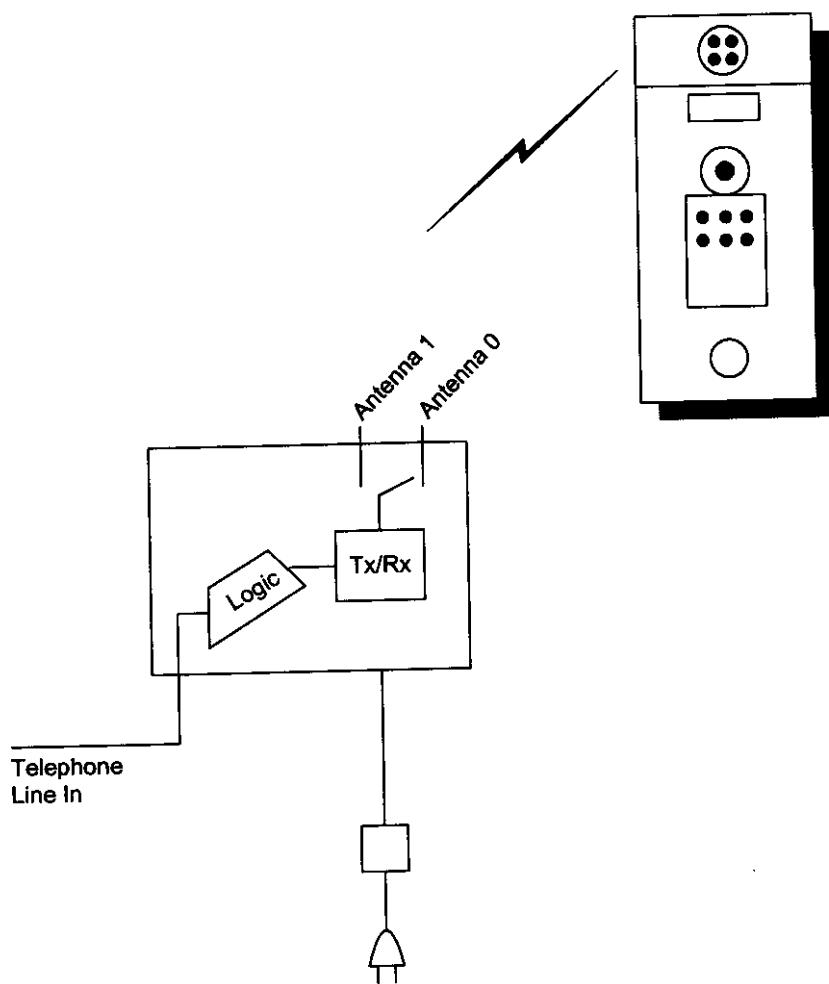
**Description of Modification for Modification Filing**

**NOT APPLICABLE**

**Family List Rational**

*EQUIPMENT: 2.4 GHz Cordless Telephone*FCC ID: OIPBEOCOM6000**Theory of Operation**

The E.U.T. is based upon DECT the ETSI Standards ETS-300-175-1 to ETS-300-9. The Mars system is improved by implementing extra features to combat interference at 2.4 GHz. The system is implemented with encryption based on DECT.

**System Diagram**

***EQUIPMENT: 2.4 GHz Cordless Telephone*****FCC ID: OIPBEOCOM6000****Section 3. Powerline Conducted Emissions**

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: Kevin Carr	DATE: January 21, 1999

**Test Results:** Complies. See attached graph.**Measurement Data:** See attached graph.

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**FCC PART 15, SUBPART C**  
**FREQUENCY HOPPING TRANSMITTERS**  
**PROJECT NO.: 8R01143.1**

**EQUIPMENT: 2.4 GHz Cordless Telephone**

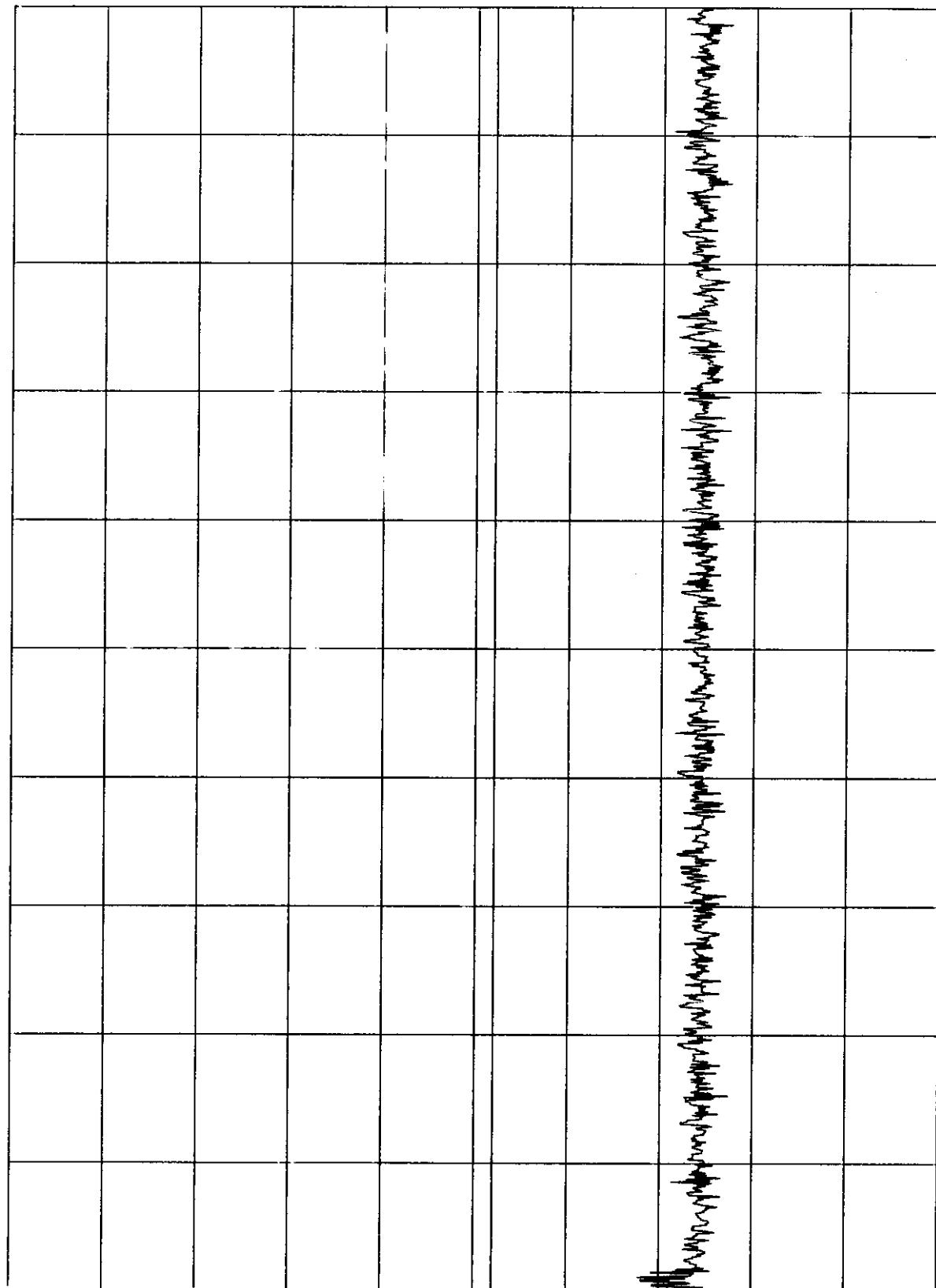
*FCC ID: OIPBEOCOM6000*

### **Measurement Data:**

8R01143 10dB Limiter used  
REF 90.0 dB V ATTEN 10 dB

January 21, 1999

Neutral



10 dB /

DL  
38.0  
dB V

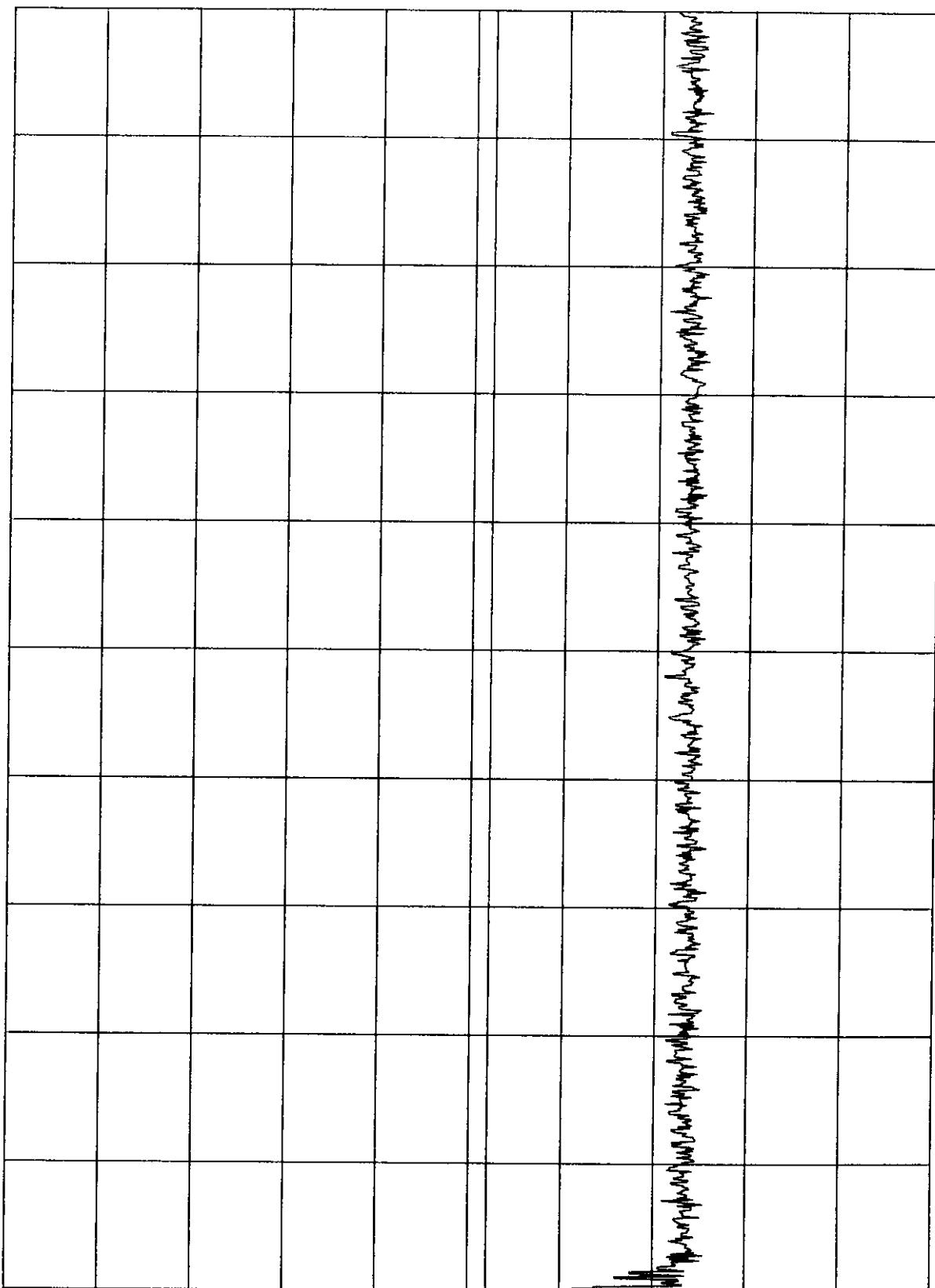
Project No.: 8R01143.1  
Conducted Emissions  
120 VAC, 60 Hz  
Page No.: 11 of 45

START 450 kHz  
RES BW 10 kHz  
VBW 30 kHz  
STOP 30.0 MHz  
SWP 887 msec

8R01143 10dB Limiter used  
REF 90.0 dB V ATTEN 10 dB

January 21, 1999

Phase



10 dB/

DL  
38.0  
dB V

Project No.: 8R01143.1  
Conducted Emissions  
120 VAC, 60 Hz  
Page No.: 12 of 45

START 450 kHz  
RES BW 10 kHz  
VBW 30 kHz

STOP 30.0 MHz  
SWP 887 msec

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**FCC PART 15, SUBPART C**  
**FREQUENCY HOPPING TRANSMITTERS**  
**PROJECT NO.: 8R01143.1**

*EQUIPMENT: 2.4 GHz Cordless Telephone*

*FCC ID: OIPBEOCOM6000*

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## **Section 4. Channel Separation**

NAME OF TEST: Channel Separation	PARA. NO.: 15.247(a)(1)
TESTED BY: Customer Supplied Data	DATE: March 25, 1999

**Test Results:** Complies.

**Measurement Data:** Measured 20 dB bandwidth: 983 kHz  
Channel Separation: 1.005382 MHz

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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## Section 5. Pseudorandom Hopping Algorithm

NAME OF TEST: Pseudorandom Hopping Algorithm	PARA. NO.: 15.247(a)(1)
TESTED BY: Customer Supplied Data	DATE: March 25, 1999

**Test Results:** Complies.

**Measurement Data:** Number of Hopping Frequencies: 79  
Number of Hopping Patterns:

*Frequency: 2402.862 + CN\* 1.005382 MHz*

i	f(i)	i	f(i)	i	f(i)	i	f(i)	i	f(i)	i	f(i)	i	f(i)	i	f(i)	i	f(i)
0	0	10	76	20	18	30	34	40	14	50	20	60	48	70	55		
1	23	11	29	21	11	31	66	41	57	51	73	61	15	71	35		
2	62	12	59	22	36	32	7	42	41	52	64	62	5	72	53		
3	8	13	22	23	72	33	68	43	74	53	39	63	17	73	24		
4	43	14	52	24	54	34	75	44	32	54	13	64	6	74	44		
5	16	15	63	25	69	35	4	45	70	55	33	65	67	75	51		
6	71	16	26	26	21	36	60	46	9	56	65	66	49	76	38		
7	47	17	77	27	3	37	27	47	58	57	50	67	40	77	30		
8	19	18	31	28	37	38	12	48	78	58	56	68	1	78	46		
9	61	19	2	29	10	39	25	49	45	59	42	69	28				

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
FCC ID: OIPBEOCOM6000

## Section 6. Time of Occupancy

NAME OF TEST: Time of Occupancy	PARA. NO.: 15.247(a)(1)
TESTED BY: Kevin Carr	DATE: March 4, 1999

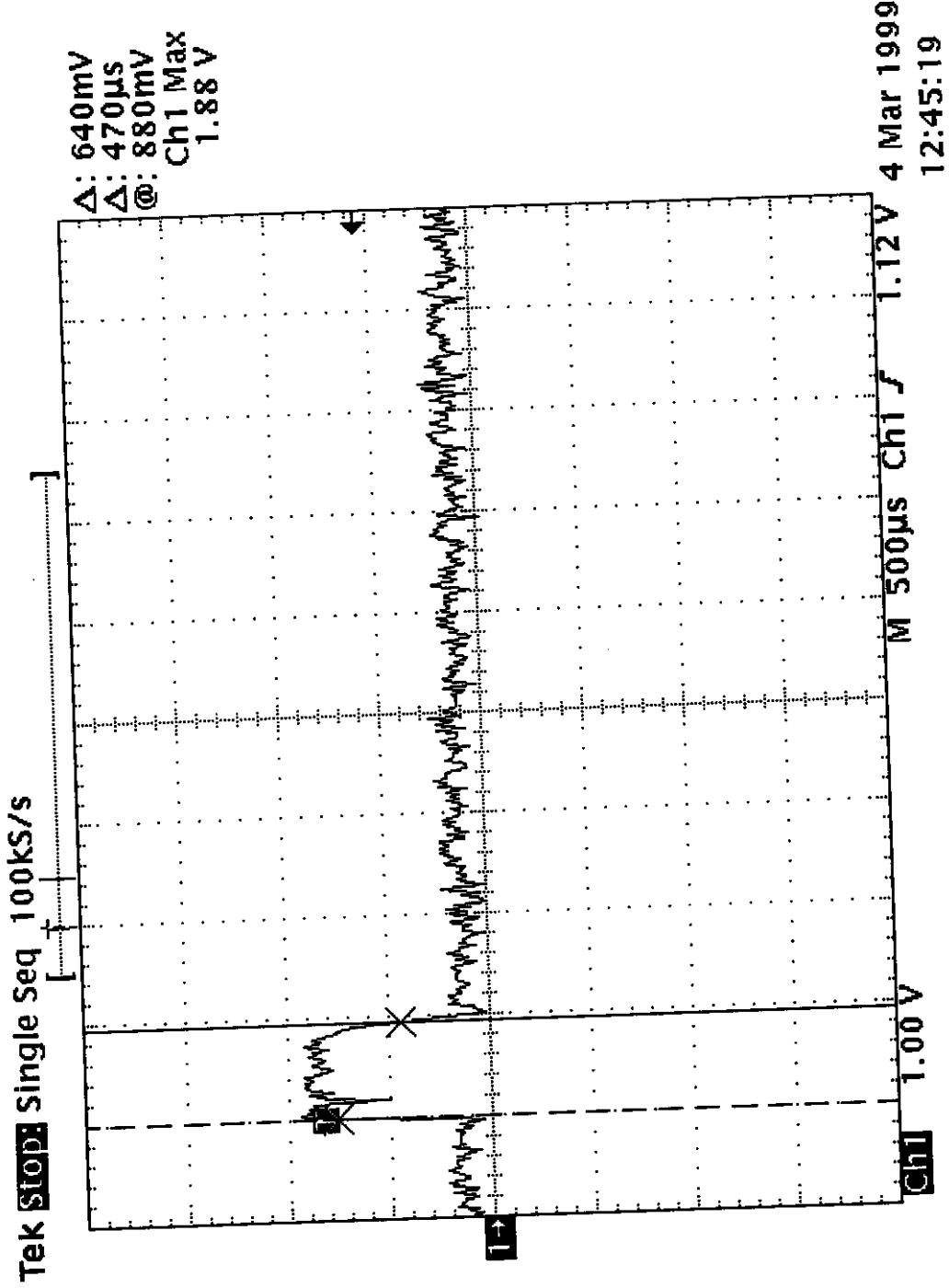
**Test Results:** Complies.

**Measurement Data:** Maximum dwell time using customer software hopping to same channel (unrealistic).

This is worst case:

$$20 \log \frac{470\mu\text{s} \times 8}{100\text{ms}} = -28.5 \text{ dB}$$

EQUIPMENT: 2.4 GHz Cordless Telephone  
FCC ID: OIPBEOCOM6000



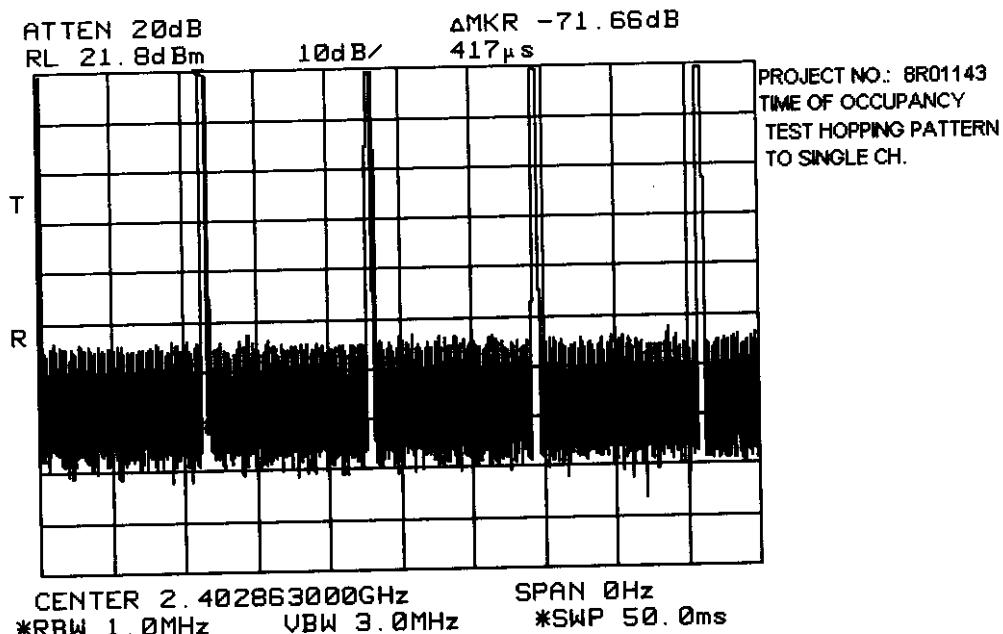
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FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

*EQUIPMENT: 2.4 GHz Cordless Telephone*

*FCC ID: OIPBEOCOM6000*

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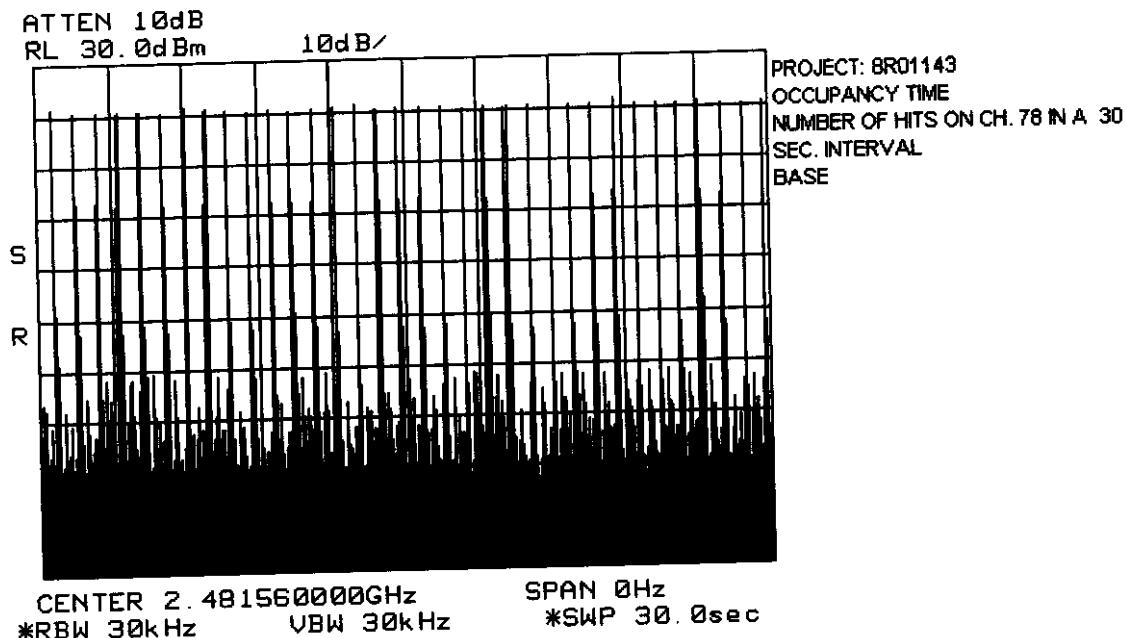
**KTL Ottawa**

FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

*EQUIPMENT: 2.4 GHz Cordless Telephone*

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FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

*EQUIPMENT: 2.4 GHz Cordless Telephone*

FCC ID: OIPBEOCOM6000

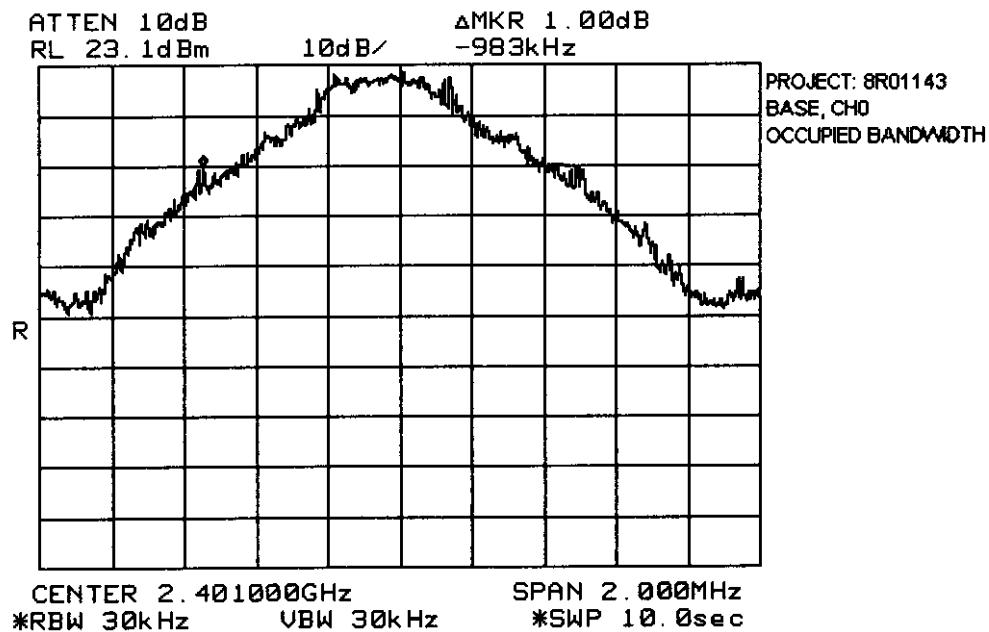
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## **Section 7.      Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.247(a)(1)(i)
TESTED BY: Kevin Carr	DATE: March 3, 1999

**Test Results:**      Complies.

**Measurement Data:**      983 kHz

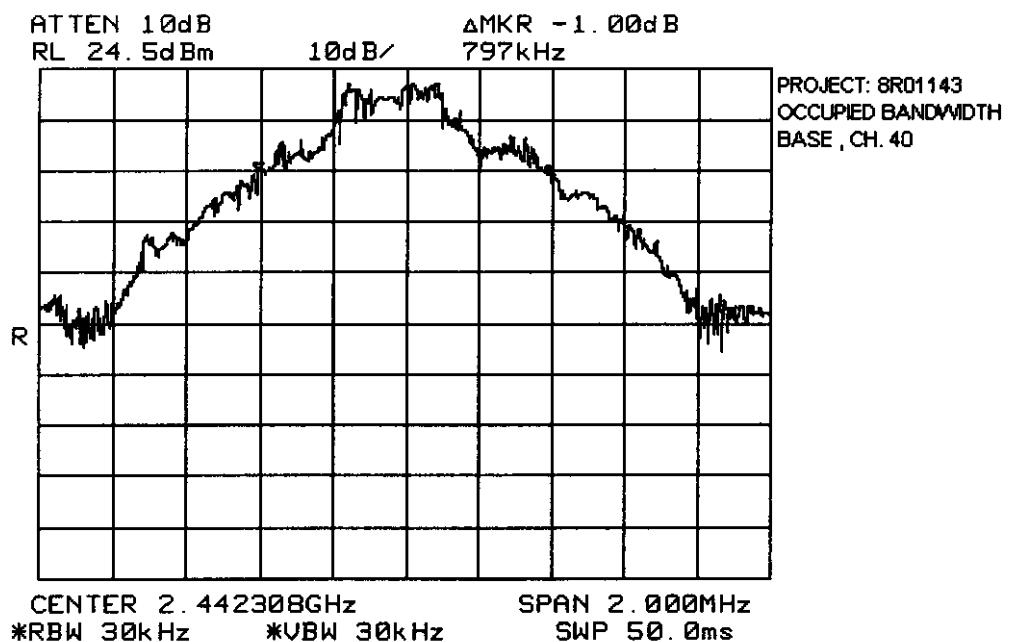
*EQUIPMENT: 2.4 GHz Cordless Telephone**FCC ID: OIPBEOCOM6000*

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FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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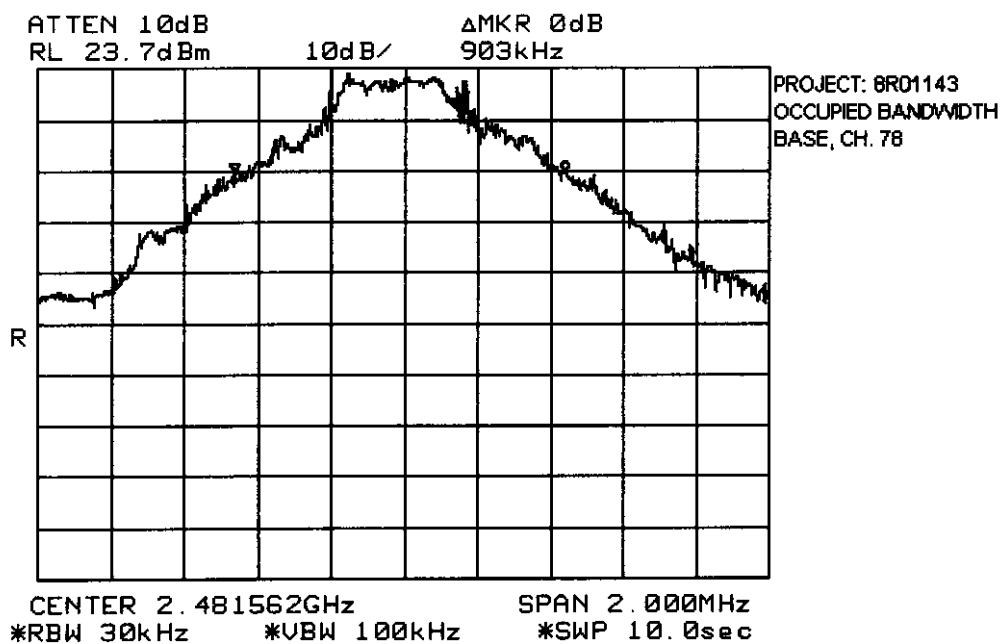
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FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

EQUIPMENT: 2.4 GHz Cordless Telephone

FCC ID: OIPBEOCOM6000

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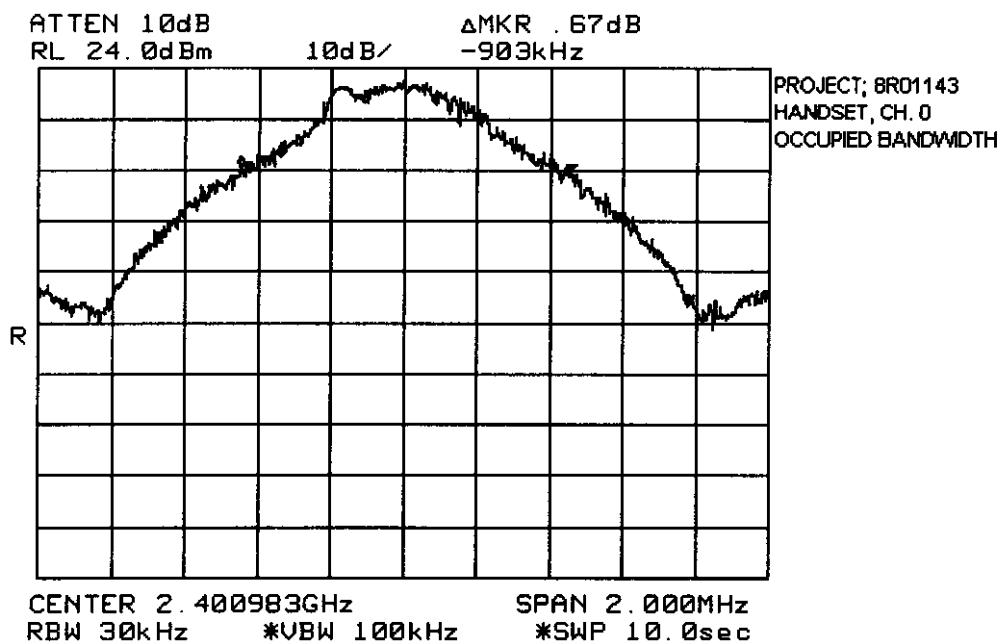


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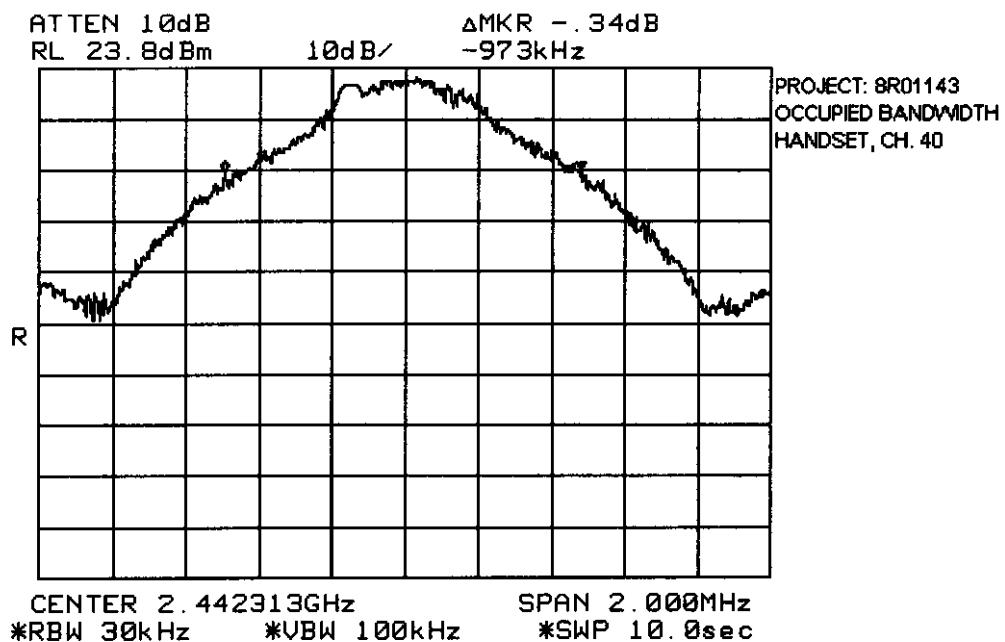
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FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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EQUIPMENT: 2.4 GHz Cordless Telephone  
FCC ID: OIPBEOCOM6000

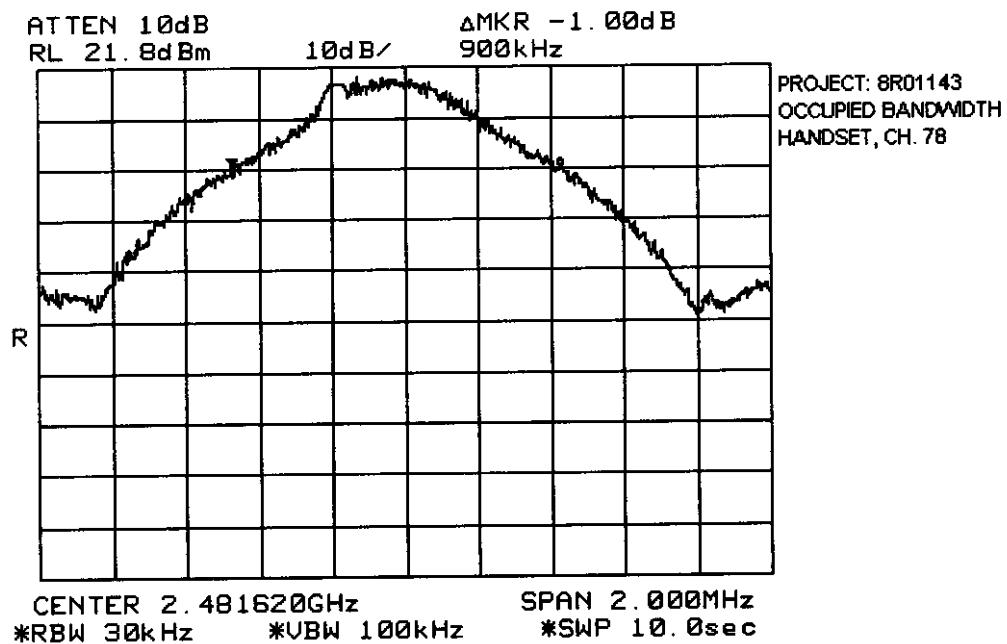


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**FCC PART 15, SUBPART C**  
**FREQUENCY HOPPING TRANSMITTERS**  
**PROJECT NO.: 8R01143.1**

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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*EQUIPMENT: 2.4 GHz Cordless Telephone**FCC ID: OIPBEOCOM6000***Section 8. Peak Power Output**

NAME OF TEST: Peak Power Output	PARA. NO.: 15.247 (b)
TESTED BY: Kevin Carr	DATE: March 24, 1999

**Test Results:** Complies. The maximum peak power output of the transmitter is 0.233 watts**Measurement Data:** Detachable antenna?  Yes  No  
If yes, state the type of non-standard connector used at the antenna port:

Directional Gain of Antenna: 0 dBi or 1 Numeric.

Peak Power Output: 0.233 watts.

Field Strength: 118.9 dB $\mu$ V/m @ 3m or 0.881 V/m @ 3m.**Antennas:**

Model	Type	Manufacturer	Gain	E.I.R.P.

EQUIPMENT: 2.4 GHz Cordless Telephone

FCC ID: OIPBEOCOM6000

## Test Data - Radiated Emissions (Peak Power Output)

Test Distance (meters) : 3		Range: A Tower		Receiver: HP8565E		RBW(kHz): 1 MHz		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Dist. Corr. dB	RCVD Signal (dB $\mu$ V/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle dB	Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
<b>Handset: Channel 0</b>											
2401.5	H2	V			83.5	31.2			114.7		
2401.3	H2	H			87.3	31.2			118.5		
<b>Handset: Channel 40</b>											
2442.8	H2	V			82.8	31.1			113.9		
2442.8	H2	H			87.8	31.1			118.9		
<b>Handset: Channel 78</b>											
2481.8	H2	V			81.2	31.2			112.4		
2482.0	H2	H			85.0	31.2			116.2		
<b>Base (Antenna 0): Channel 0</b>											
2401.1	H2	V			82.0	31.2			113.2		
2401.4	H2	H			82.0	31.2			113.2		
<b>Base (Antenna 0): Channel 40</b>											
2442.5	H2	V			82.8	31.1			113.9		
2442.6	H2	H			81.7	31.1			112.8		
<b>Base (Antenna 0): Channel 78</b>											
2481.7	H2	V			79.5	31.2			110.7		
2481.8	H2	H			81.5	31.2			112.7		
<b>Base (Antenna 1): Channel 0</b>											
2401.1	H2	V			79.3	31.2			110.5		
2401.2	H2	H			78.0	31.2			109.2		
<b>Base (Antenna 1): Channel 40</b>											
2442.6	H2	V			81.5	31.1			112.6		
2442.6	H2	H			81.0	31.1			112.1		
<b>Base (Antenna 1): Channel 78</b>											
2482.2	H2	V			80.7	31.2			111.9		
2481.8	H2	H			78.3	31.2			109.5		
<b>Notes:</b>											
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole											
* Re-measured using dipole antenna.											
** Includes cable loss when amplifier is not used.											
*** Includes cable loss.											
( ) Denotes failing emission level.											

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FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
FCC ID: OIPBEOCOM6000

**Section 9. Spurious Emissions (Antenna Conducted)**

NAME OF TEST: Spurious Emissions (Antenna Conducted) PARA. NO.: 15.247(c)

TESTED BY: Kevin Carr

DATE: March 4, 1999

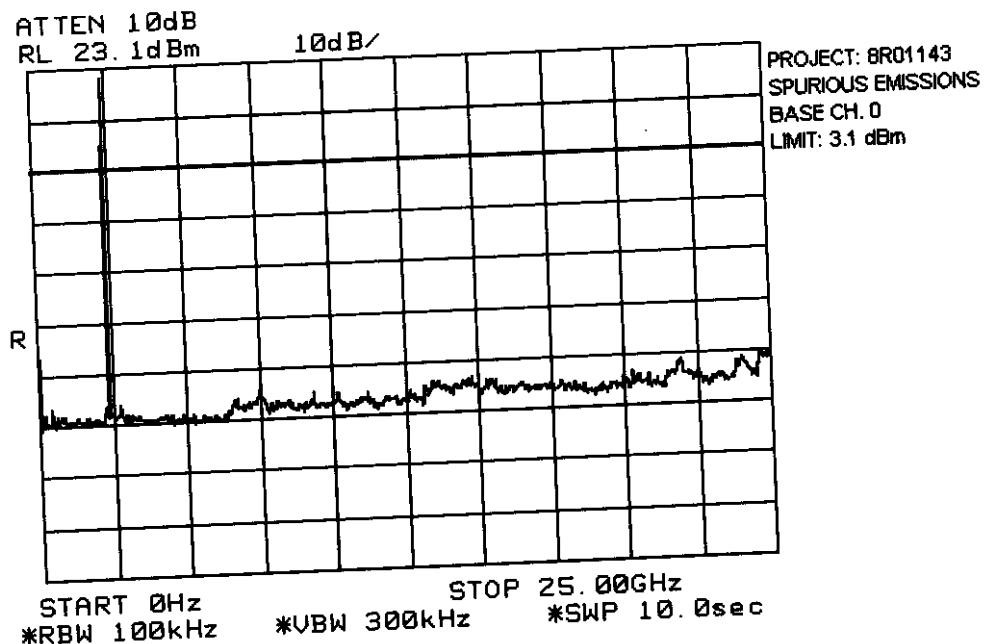
**Test Results:** Complies.

**Measurement Data:**

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FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1

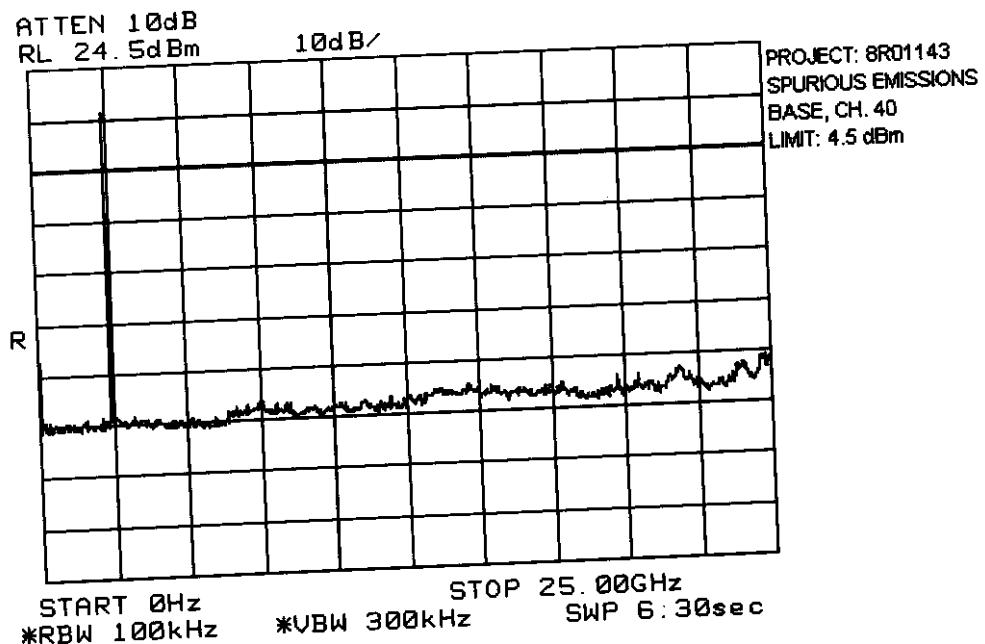
*EQUIPMENT: 2.4 GHz Cordless Telephone*  
FCC ID: OIPBEOCOM6000



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EQUIPMENT: 2.4 GHz Cordless Telephone  
FCC ID: OIPBEOCOM6000



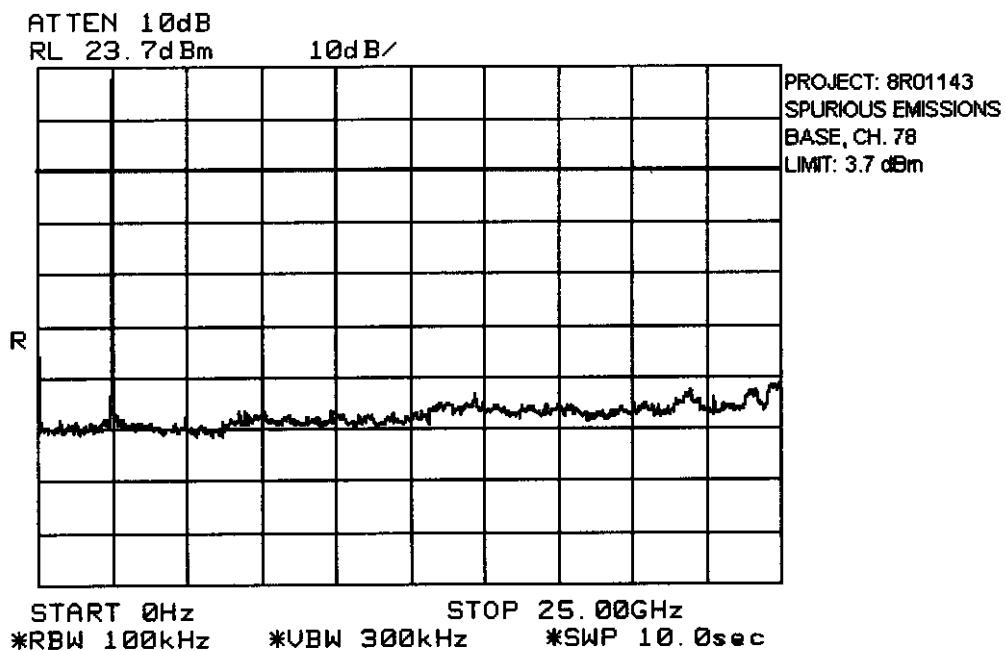
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**PROJECT NO.: 8R01143.1**

*EQUIPMENT: 2.4 GHz Cordless Telephone*

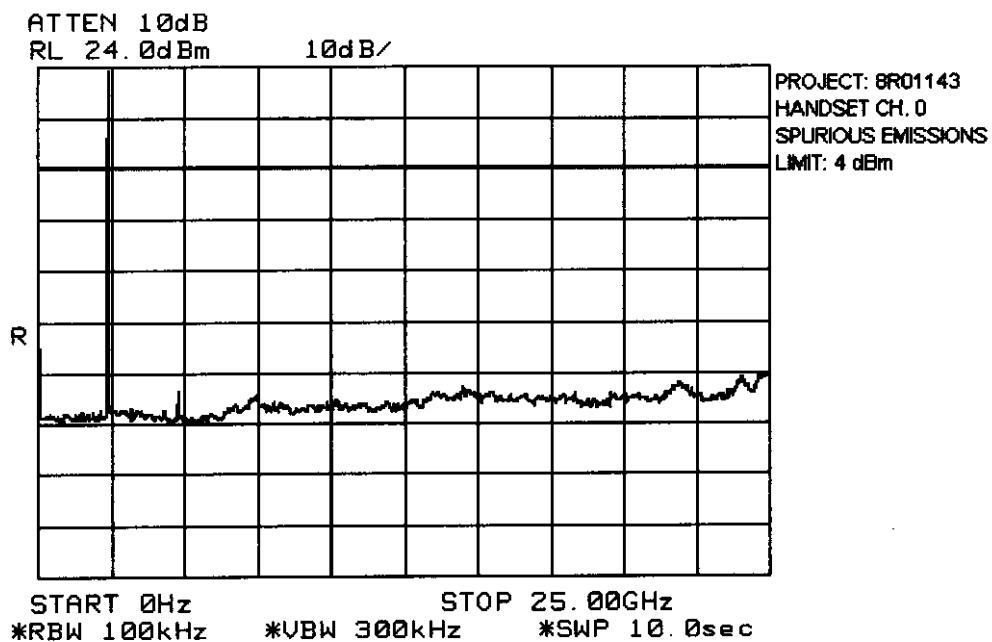
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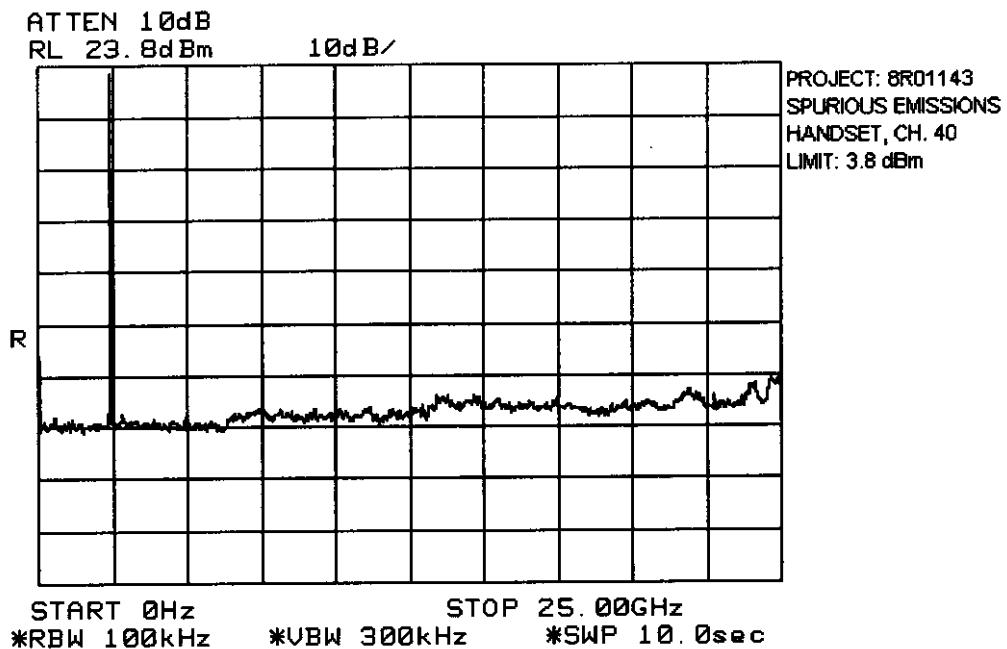
*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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EQUIPMENT: 2.4 GHz Cordless Telephone

FCC ID: OIPBEOCOM6000

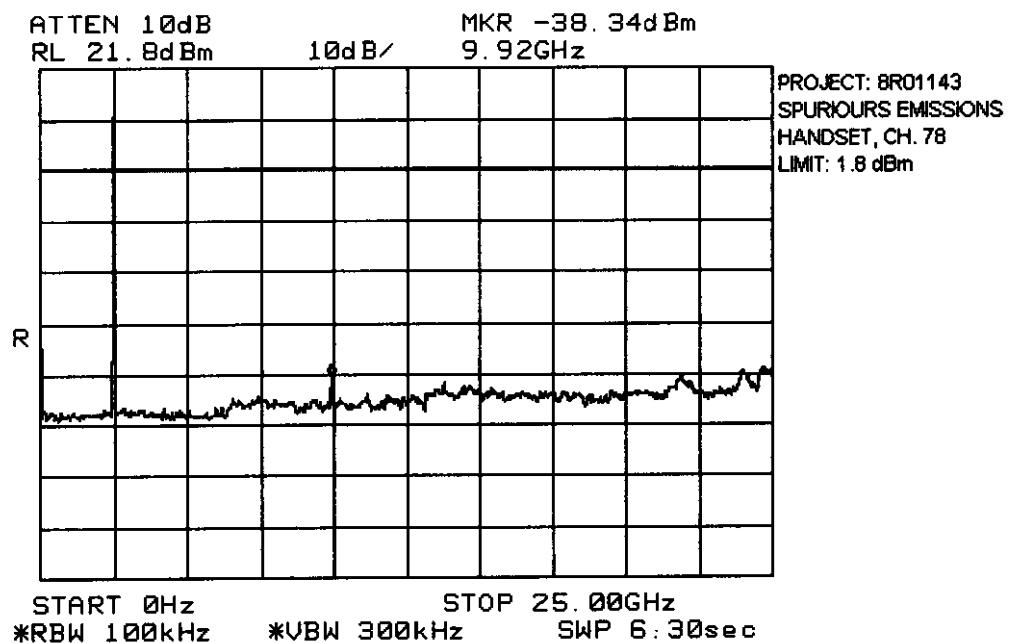


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FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
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FCC ID: OIPBEOCOM6000



*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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## Section 10. Spurious Emissions (Radiated)

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.247(c)
TESTED BY: Kevin Carr	DATE: March 24, 1999

**Test Results:** Complies. The worst case emission level is 72.1 dB $\mu$ V/m @ 3m at 7328 MHz. This is 1.9 dB below the specification limit.

**Measurement Data:** See attached table.

**Duty Cycle Calculation:**

EQUIPMENT: 2.4 GHz Cordless Telephone

FCC ID: OIPBEOCOM6000

## Test Data - Radiated Emissions Base (Peak)

Test Distance (meters) : 1/3		Range: A Tower		Receiver: HP8565E		RBW(kHz): 1 MHz		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Dist. Corr. dB	RCVD Signal (dB $\mu$ V/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle dB	Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
<b>Base (Antenna 0): Channel 0</b>											
4802.6	H2	V			75.0	38.4	-44.1		69.3	74.0	4.7
4802.2	H2	H			70.0	38.4	-44.1		64.3	74.0	9.7
12007.0	H2	V		-9.5	32.8	38.9			62.2	74.0	11.8
12007.0	H2	H		-9.5	33.5	38.9			62.9	74.0	11.1
19211.2	SH50-1	V		-9.5	34.3	40.4			65.2	74.0	8.8
19211.2	SH50-1	H		-9.5	32.8	40.4			63.7	74.0	10.3
<b>Base (Antenna 0): Channel 40</b>											
4885.0	H2	V			70.5	38.8	-44.3		65.0	74.0	9.0
4885.0	H2	H			71.5	38.8	-44.3		66.0	74.0	8.0
7327.3	H2	V			63.0	44.6	-42.2		65.4	74.0	8.6
7327.3	H2	H			63.5	44.6	-42.2		65.9	74.0	8.1
12215.0	H2	V		-9.5	33.7	38.9			63.1	74.0	10.9
12215.0	H2	H		-9.5	33.2	38.9			62.6	74.0	11.4
19544.0	SH50-1	V		-9.5	33.0	40.5			64.0	74.0	10.0
19544.0	SH50-1	H		-9.5	35.2	40.5			66.2	74.0	7.8
<b>Base (Antenna 0): Channel 78</b>											
4963.5	H2	V			66.7	39.1	-44.5		61.3	74.0	12.7
4964.1	H2	H			65.5	39.1	-44.5		60.1	74.0	13.9
7445.1	H2	V			57.5	44.8	-42.0		60.3	74.0	13.7
7445.2	H2	H			58.7	44.8	-42.0		61.5	74.0	12.5
12410.4	H2	V		-9.5	32.3	38.9			61.7	74.0	12.3
12410.4	H2	H		-9.5	32.8	38.9			62.2	74.0	11.8
19856.7	SH50-1	V		-9.5	31.8	40.5			62.8	74.0	11.2
19856.7	SH50-1	H		-9.5	33.2	40.5			64.2	74.0	9.8
22338.8	SH50-1	V		-9.5	36.0	40.6			67.1	74.0	6.9
22338.8	SH50-1	H		-9.5	35.8	40.6			66.9	74.0	7.1
<b>Notes:</b>											
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole											
* Re-measured using dipole antenna.											
** Includes cable loss when amplifier is not used.											
*** Includes cable loss.											
( ) Denotes failing emission level.											
Frequency above 10 GHz where measured at 1 m.											

EQUIPMENT: 2.4 GHz Cordless Telephone

FCC ID: OIPBEOCOM6000

## Test Data - Radiated Emissions Base (Peak)

Test Distance (meters) : 1/3		Range: A Tower		Receiver: HP8565E		RBW(kHz): 1 MHz		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Dist. Corr. dB	RCVD Signal (dB $\mu$ V/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle dB	Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
<b>Base (Antenna 1): Channel 0</b>											
4802.0	H2	V			71.7	38.4	-44.1		66.0	74.0	8.0
4802.3	H2	H			70.2	38.4	-44.1		64.5	74.0	9.5
12007.0	H2	V		-9.5	32.7	38.9			62.1	74.0	11.9
12007.0	H2	H		-9.5	32.5	38.9			61.9	74.0	12.1
19211.2	SH50-1	V		-9.5	33.7	40.4			64.6	74.0	9.4
19211.2	SH50-1	H		-9.5	35.3	40.4			66.2	74.0	7.8
<b>Base (Antenna 1): Channel 40</b>											
4884.8	H2	V			69.2	38.8	-44.3		63.7	74.0	10.3
4885.5	H2	H			68.2	38.8	-44.3		62.7	74.0	11.3
7327.1	H2	V			62.2	44.6	-42.2		64.6	74.0	9.4
7327.2	H2	H			62.0	44.6	-42.2		64.4	74.0	9.6
12213.4	H2	V		-9.5	33.0	38.9			62.4	74.0	11.6
12213.4	H2	H		-9.5	32.7	38.9			62.1	74.0	11.9
19541.5	SH50-1	V		-9.5	34.3	40.5			65.3	74.0	8.7
19544.0	SH50-1	H		-9.5	33.8	40.5			64.8	74.0	9.2
<b>Base (Antenna 1): Channel 78</b>											
4963.9	H2	V			58.8	39.1	-44.5		53.4	74.0	20.6
4964.1	H2	H			59.7	39.1	-44.5		54.3	74.0	19.7
7445.0	H2	V			58.8	44.8	-42.0		61.6	74.0	12.4
7446.4	H2	H			58.2	44.8	-42.0		61.0	74.0	13.0
12410.4	H2	V		-9.5	32.8	38.9			62.2	74.0	11.8
12410.4	H2	H		-9.5	33.5	38.9			62.9	74.0	11.1
19856.7	SH50-1	V		-9.5	34.2	40.5			65.2	74.0	8.8
19856.7	SH50-1	H		-9.5	33.5	40.5			64.5	74.0	9.5
22338.8	SH50-1	V		-9.5	34.5	40.6			65.6	74.0	8.4
22338.8	SH50-1	H		-9.5	35.8	40.6			66.9	74.0	7.1
Notes:											
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole											
* Re-measured using dipole antenna.											
** Includes cable loss when amplifier is not used.											
*** Includes cable loss.											
() Denotes failing emission level.											
Frequency above 10 GHz where measured at 1 m.											

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

### Test Data - Radiated Emissions Handset (Peak)

Test Distance (meters) : 1/3		Range: A Tower		Receiver: HP8565E		RBW(kHz): 1 MHz		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Dist. Corr. dB	RCVD Signal (dB $\mu$ V/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle dB	Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
<b>Handset: Channel 0</b>											
4802.2	H2	V			58.0	38.4	-44.1		52.3	74.0	21.7
4802.0	H2	H			63.2	38.4	-44.1		57.5	74.0	16.5
12014.0	H2	V		-9.5	33.7	38.9			63.1	74.0	10.9
12014.0	H2	H		-9.5	32.0	38.9			61.4	74.0	12.6
19223.0	SH50-1	V		-9.5	32.5	40.4			63.4	74.0	10.6
19223.0	SH50-1	H		-9.5	33.3	40.4			64.2	74.0	9.8
<b>Handset: Channel 40</b>											
4884.8	H2	V			59.2	38.8	-44.3		53.7	74.0	20.3
4884.7	H2	H			63.5	38.8	-44.3		58.0	74.0	16.0
7327.2	H2	V			65.7	44.6	-42.2		68.1	74.0	5.9
7328.0	H2	H			69.7	44.6	-42.2		72.1	74.0	1.9
12215.0	H2	V		-9.5	33.5	38.9			62.9	74.0	11.1
12215.0	H2	H		-9.5	32.2	38.9			61.6	74.0	12.4
19545.0	SH50-1	V		-9.5	33.0	40.5			64.0	74.0	10.0
19545.0	SH50-1	H		-9.5	33.3	40.5			64.3	74.0	9.7
<b>Handset: Channel 78</b>											
4963.4	H2	V			63.0	39.1	-44.5		57.6	74.0	16.4
4963.4	H2	H			67.0	39.1	-44.5		61.6	74.0	12.4
7446.4	H2	V			63.3	44.8	-42.0		66.1	74.0	7.9
7445.2	H2	H			66.2	44.8	-42.0		69.0	74.0	5.0
12406.0	H2	V		-9.5	37.7	38.9			67.1	74.0	6.9
12406.0	H2	H		-9.5	38.2	38.9			67.6	74.0	6.4
19850.0	SH50-1	V		-9.5	38.0	40.5			69.0	74.0	5.0
19850.0	SH50-1	H		-9.5	39.0	40.5			70.0	74.0	4.0
22331.0	SH50-1	V		-9.5	39.5	40.6			70.6	74.0	3.4
22331.0	SH50-1	H		-9.5	37.8	40.6			68.9	74.0	5.1
<b>Notes:</b>											
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole											
* Re-measured using dipole antenna.											
** Includes cable loss when amplifier is not used.											
*** Includes cable loss.											
() Denotes failing emission level.											
Frequency above 10 GHz where measured at 1 m.											

EQUIPMENT: 2.4 GHz Cordless Telephone

FCC ID: OIPBEOCOM6000

## Test Data - Radiated Emissions Base (Average)

Test Distance (meters) : 1/3		Range: A Tower		Receiver: HP8565E		RBW(kHz): 1 MHz		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Dist. Corr. dB	RCVD Signal (dB $\mu$ V/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle dB	Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
<b>Base (Antenna 0): Channel 0</b>											
4802.6	H2	V			75.0	38.4	-44.1	-20	49.3	54.0	4.7
4802.2	H2	H			70.0	38.4	-44.1	-20	44.3	54.0	9.7
12007.0	H2	V		-9.5	32.8	38.9		-20	42.2	54.0	11.8
12007.0	H2	H		-9.5	33.5	38.9		-20	42.9	54.0	11.1
19211.2	SH50-1	V		-9.5	34.3	40.4		-20	45.2	54.0	8.8
19211.2	SH50-1	H		-9.5	32.8	40.4		-20	43.7	54.0	10.3
<b>Base (Antenna 0): Channel 40</b>											
4885.0	H2	V			70.5	38.8	-44.3	-20	45.0	54.0	9.0
4885.0	H2	H			71.5	38.8	-44.3	-20	46.0	54.0	8.0
7327.3	H2	V			63.0	44.6	-42.2	-20	45.4	54.0	8.6
7327.3	H2	H			63.5	44.6	-42.2	-20	45.9	54.0	8.1
12215.0	H2	V		-9.5	33.7	38.9		-20	43.1	54.0	10.9
12215.0	H2	H		-9.5	33.2	38.9		-20	42.6	54.0	11.4
19544.0	SH50-1	V		-9.5	33.0	40.5		-20	44.0	54.0	10.0
19544.0	SH50-1	H		-9.5	35.2	40.5		-20	46.2	54.0	7.8
<b>Base (Antenna 0): Channel 78</b>											
4963.5	H2	V			66.7	39.1	-44.5	-20	41.3	54.0	12.7
4964.1	H2	H			65.5	39.1	-44.5	-20	40.1	54.0	13.9
7445.1	H2	V			57.5	44.8	-42.0	-20	40.3	54.0	13.7
7445.2	H2	H			58.7	44.8	-42.0	-20	41.5	54.0	12.5
12410.4	H2	V		-9.5	32.3	38.9		-20	41.7	54.0	12.3
12410.4	H2	H		-9.5	32.8	38.9		-20	42.2	54.0	11.8
19856.7	SH50-1	V		-9.5	31.8	40.5		-20	42.8	54.0	11.2
19856.7	SH50-1	H		-9.5	33.2	40.5		-20	44.2	54.0	9.8
22338.8	SH50-1	V		-9.5	36.0	40.6		-20	47.1	54.0	6.9
22338.8	SH50-1	H		-9.5	35.8	40.6		-20	46.9	54.0	7.1
Notes:											
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole											
* Re-measured using dipole antenna.											
** Includes cable loss when amplifier is not used.											
*** Includes cable loss.											
( ) Denotes failing emission level.											
Frequency above 10 GHz where measured at 1 m.											

EQUIPMENT: 2.4 GHz Cordless Telephone

FCC ID: OIPBEOCOM6000

## Test Data - Radiated Emissions Base (Average)

Test Distance (meters) : 1/3		Range: A Tower		Receiver: HP8565E		RBW(kHz): 1 MHz		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Dist. Corr. dB	RCVD Signal (dB $\mu$ V/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle dB	Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
<b>Base (Antenna 1): Channel 0</b>											
4802.0	H2	V			71.7	38.4	-44.1	-20	46.0	54.0	8.0
4802.3	H2	H			70.2	38.4	-44.1	-20	44.5	54.0	9.5
12007.0	H2	V		-9.5	32.7	38.9		-20	42.1	54.0	11.9
12007.0	H2	H		-9.5	32.5	38.9		-20	41.9	54.0	12.1
19211.2	SH50-1	V		-9.5	33.7	40.4		-20	44.6	54.0	9.4
19211.2	SH50-1	H		-9.5	35.3	40.4		-20	46.2	54.0	7.8
<b>Base (Antenna 1): Channel 40</b>											
4884.8	H2	V			69.2	38.8	-44.3	-20	43.7	54.0	10.3
4885.5	H2	H			68.2	38.8	-44.3	-20	42.7	54.0	11.3
7327.1	H2	V			62.2	44.6	-42.2	-20	44.6	54.0	9.4
7327.2	H2	H			62.0	44.6	-42.2	-20	44.4	54.0	9.6
12213.4	H2	V		-9.5	33.0	38.9		-20	42.4	54.0	11.6
12213.4	H2	H		-9.5	32.7	38.9		-20	42.1	54.0	11.9
19541.5	SH50-1	V		-9.5	34.3	40.5		-20	45.3	54.0	8.7
19544.0	SH50-1	H		-9.5	33.8	40.5		-20	44.8	54.0	9.2
<b>Base (Antenna 1): Channel 78</b>											
4963.9	H2	V			58.8	39.1	-44.5	-20	33.4	54.0	20.6
4964.1	H2	H			59.7	39.1	-44.5	-20	34.3	54.0	19.7
7445.0	H2	V			58.8	44.8	-42.0	-20	41.6	54.0	12.4
7446.4	H2	H			58.2	44.8	-42.0	-20	41.0	54.0	13.0
12410.4	H2	V		-9.5	32.8	38.9		-20	42.2	54.0	11.8
12410.4	H2	H		-9.5	33.5	38.9		-20	42.9	54.0	11.1
19856.7	SH50-1	V		-9.5	34.2	40.5		-20	45.2	54.0	8.8
19856.7	SH50-1	H		-9.5	33.5	40.5		-20	44.5	54.0	9.5
22338.8	SH50-1	V		-9.5	34.5	40.6		-20	45.6	54.0	8.4
22338.8	SH50-1	H		-9.5	35.8	40.6		-20	46.9	54.0	7.1
<b>Notes:</b>											
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole											
* Re-measured using dipole antenna.											
** Includes cable loss when amplifier is not used.											
*** Includes cable loss.											
( ) Denotes failing emission level.											
Frequency above 10 GHz where measured at 1 m.											

EQUIPMENT: 2.4 GHz Cordless Telephone  
FCC ID: OIPBEOCOM6000**Test Data - Radiated Emissions Handset (Average)**

Test Distance (meters) : 1/3		Range: A Tower		Receiver: HP8565E		RBW(kHz): 1 MHz		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Dist. Corr. dB	RCVD Signal (dB $\mu$ V/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle dB	Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
<b>Handset: Channel 0</b>											
4802.2	H2	V			58.0	38.4	-44.1	-20	32.3	54.0	21.7
4802.0	H2	H			63.2	38.4	-44.1	-20	37.5	54.0	16.5
12014.0	H2	V		-9.5	33.7	38.9		-20	43.1	54.0	10.9
12014.0	H2	H		-9.5	32.0	38.9		-20	41.4	54.0	12.6
19223.0	SH50-1	V		-9.5	32.5	40.4		-20	43.4	54.0	10.6
19223.0	SH50-1	H		-9.5	33.3	40.4		-20	44.2	54.0	9.8
<b>Handset: Channel 40</b>											
4884.8	H2	V			59.2	38.8	-44.3	-20	33.7	54.0	20.3
4884.7	H2	H			63.5	38.8	-44.3	-20	38.0	54.0	16.0
7327.2	H2	V			65.7	44.6	-42.2	-20	48.1	54.0	5.9
7328.0	H2	H			69.7	44.6	-42.2	-20	52.1	54.0	1.9
12215.0	H2	V		-9.5	33.5	38.9		-20	42.9	54.0	11.1
12215.0	H2	H		-9.5	32.2	38.9		-20	41.6	54.0	12.4
19545.0	SH50-1	V		-9.5	33.0	40.5		-20	44.0	54.0	10.0
19545.0	SH50-1	H		-9.5	33.3	40.5		-20	44.3	54.0	9.7
<b>Handset: Channel 78</b>											
4963.4	H2	V			63.0	39.1	-44.5	-20	37.6	54.0	16.4
4963.4	H2	H			67.0	39.1	-44.5	-20	41.6	54.0	12.4
7446.4	H2	V			63.3	44.8	-42.0	-20	46.1	54.0	7.9
7445.2	H2	H			66.2	44.8	-42.0	-20	49.0	54.0	5.0
12406.0	H2	V		-9.5	37.7	38.9		-20	47.1	54.0	6.9
12406.0	H2	H		-9.5	38.2	38.9		-20	47.6	54.0	6.4
19850.0	SH50-1	V		-9.5	38.0	40.5		-20	49.0	54.0	5.0
19850.0	SH50-1	H		-9.5	39.0	40.5		-20	50.0	54.0	4.0
22331.0	SH50-1	V		-9.5	39.5	40.6		-20	50.6	54.0	3.4
22331.0	SH50-1	H		-9.5	37.8	40.6		-20	48.9	54.0	5.1
Notes:											
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole											
* Re-measured using dipole antenna.											
** Includes cable loss when amplifier is not used.											
*** Includes cable loss.											
( ) Denotes failing emission level.											
Frequency above 10 GHz where measured at 1 m.											

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

## Section 11. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	May 20/98	May 20/99	
1 Year	Spectrum Analyzer-1	Hewlett Packard	8566B	2311A02238	Oct. 22/98	Oct. 22/99	
1 Year	Spectrum Analyzer Display-1	Hewlett Packard	8566B	2314A04759	Oct. 22/98	Oct. 22/99	
1 Year	Quasi-peak adapter-1	Hewlett-Packard	85650A	2043A00302	Oct. 22/98	Oct. 22/99	
1 Year	Attenuator	Narda	768-20	9507	July 24/98	July 24/99	
1 Year	Attenuator	Narda	768-10	9704	July 24/98	July 24/99	
2 Year	Horn Antenna	EMCO #2	3115	4336	Oct. 30/97	Oct. 30/99	
1 Year	Digital Storage Oscilloscope	Tektronix	TDS544A	B012005	July 23/98	July 23/99	
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Aug. 4/98	Aug. 4/99	
1 Year	Low Noise Amplifier	DBS Microwave	DWT-13035	9623	Aug. 4/98	Aug. 4/99	
3 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-1	FA000479	July 29/97	July 29/00	
1 Year	Plotter	Hewlett Packard	7550A	FA001129	NCR	NCR	
1 Year	High Pass Filter	Microwave Inc.	11SH10-400	FA001340	Feb. 26/99	Feb. 26/00	

NA: Not Applicable

NCR: No Cal Required

**KTL Ottawa**

FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1  
ANNEX A

*EQUIPMENT: 2.4 GHz Cordless Telephone*

FCC ID: OIPBEOCOM6000

**ANNEX A**

**TEST METHODOLOGIES**

**KTL Ottawa**

FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1  
ANNEX A

*EQUIPMENT: 2.4 GHz Cordless Telephone*

FCC ID: OIPBEOCOM6000

**NAME OF TEST:** Powerline Conducted Emissions

**PARA. NO.:** 15.207(a)

**Minimum Standard:**

The R.F. that is conducted back onto the AC power line on any frequency within the band 0.45 to 30 MHz shall not exceed 250 $\mu$ V (48 dB $\mu$ V) across 50 ohms.

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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NAME OF TEST: Channel Separation

PARA. NO.: 15.247(a)(1)

**Minimum Standard:**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

*EQUIPMENT: 2.4 GHz Cordless Telephone*

*FCC ID: OIPBEOCOM6000*

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NAME OF TEST: Pseudorandom Hopping Algorithm	PARA. NO.: 15.247(a)(1)
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**Minimum Standard:**

The system shall hop to channel frequencies that are selected from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 75 hopping frequencies.

*EQUIPMENT: 2.4 GHz Cordless Telephone*

FCC ID: OIPBEOCOM6000

NAME OF TEST: Time of Occupancy

PARA. NO.: 15.247(a)(1)(ii)

**Minimum Standard:** The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

*EQUIPMENT: 2.4 GHz Cordless Telephone*FCC ID: OIPBEOCOM6000

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(2)

**Minimum Standard:** The maximum allowed 20 dB bandwidth of the hopping channel is 1 MHz for 2400-2483.5 MHz transmitters.**Method Of Measurement:**

The spectrum analyzer is set as follows:

RBW: At least 1% of span/div.

VBW: &gt;RBW

Span: Sufficient to display 20 dB bandwidth

LOG dB/div.: 10 dB

Sweep: Auto

## Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

NAME OF TEST: Peak Power Output

PARA. NO.: 15.247(b)

**Minimum Standard:**

The maximum peak power output shall not exceed 1 watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

**Direct Measurement Method For Detachable Antennas:**

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load.

**Calculation Of EIRP For Integral Antenna:**

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation  $GP/4\pi R^2 = E^2/120\pi$  and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

The RBW of the spectrum analyzer shall be set to a value greater than the measured 20 dB occupied bandwidth of the E.U.T.

**Number of channels tested:**

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

*EQUIPMENT: 2.4 GHz Cordless Telephone*

*FCC ID: OIPBEOCOM6000*

NAME OF TEST: Spurious Emissions at Antenna Terminals PARA. NO.: 15.247(c)

**Minimum Standard:** In any 100kHz bandwidth outside the 2400-2483.5 MHz bands emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength ( $\mu$ V/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

**Method Of Measurement:**

30 MHz - 10th harmonic plot

RBW: 100 kHz

VBW: 300 kHz

Sweep: Auto

Display line: -20 dBc

Lower Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 2400 MHz

Marker: Peak of fundamental emission

Marker Δ: Peak of highest spurious level below 2400 MHz

Upper Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 2483.5 MHz

Marker: Peak of fundamental emission

Marker Δ: Peak of highest spurious level above 2483.5 MHz

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

NAME OF TEST: Radiated Spurious Emissions	PARA. NO.: 15.247(c)
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**Minimum Standard:** In any 100kHz bandwidth outside the 2400-2483.5 MHz bands emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits.  
**Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:**

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

*THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC*

#### 15.205 Restricted Bands

MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.125-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41	1718		

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

**KTL Ottawa**

FCC PART 15, SUBPART C  
FREQUENCY HOPPING TRANSMITTERS  
PROJECT NO.: 8R01143.1  
ANNEX B

*EQUIPMENT: 2.4 GHz Cordless Telephone*

FCC ID: OIPBEOCOM6000

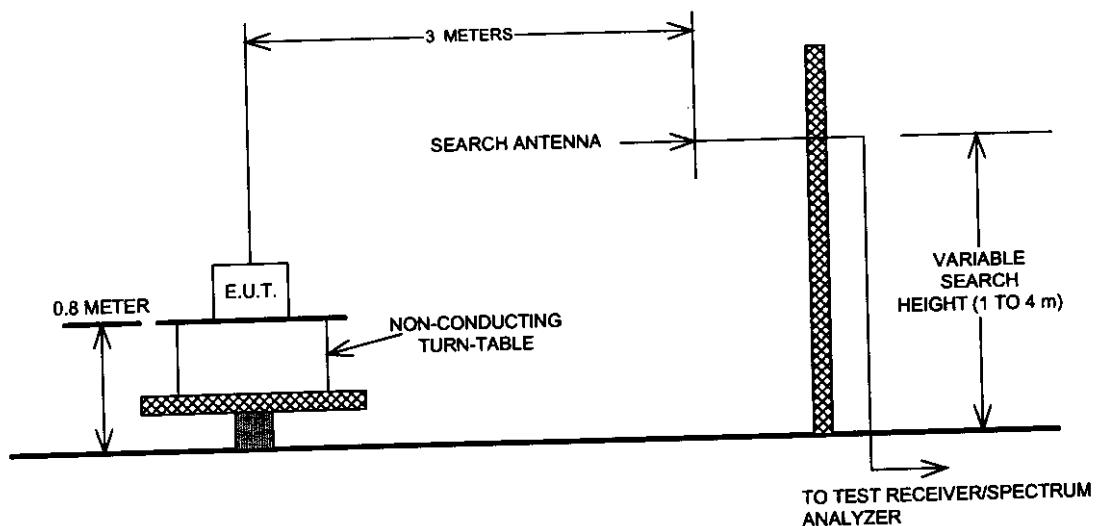
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**ANNEX B**

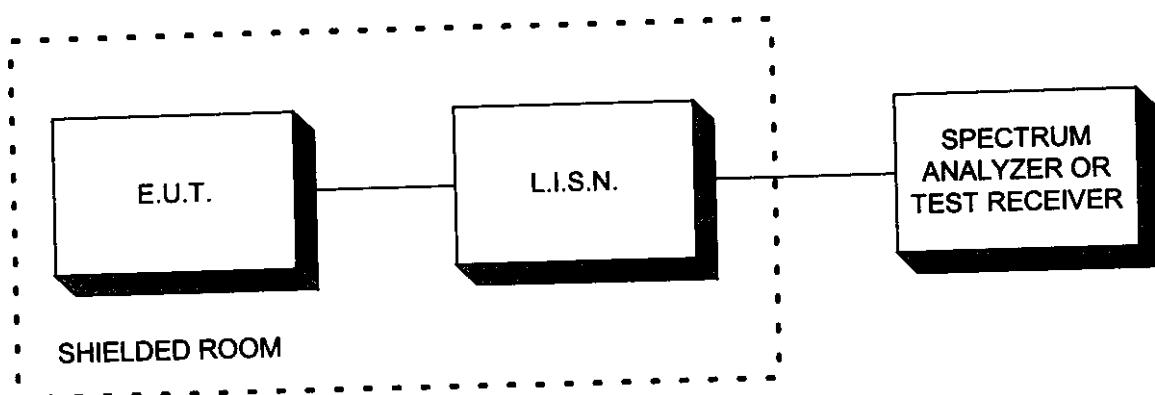
**BLOCK DIAGRAMS**

EQUIPMENT: 2.4 GHz Cordless Telephone  
FCC ID: OIPBEOCOM6000

### Test Site For Radiated Emissions



### Conducted Emissions



*EQUIPMENT: 2.4 GHz Cordless Telephone*  
*FCC ID: OIPBEOCOM6000*

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**Peak Power At Antenna Terminals**

