



KTL Ottawa

Safety - EMI - Telecom - ISO Guide 25

ENGINEERING TEST REPORT

ON:

**THE VTECH ENGINEERING CANADA LTD.
"VT9111 CORDLESS PHONE FAMILY LISTED WITH VT9115"**

**IN ACCORDANCE WITH:
FCC PART 15, SUBPART C, 15.249
FOR 900 MHz CORDLESS TELEPHONES**

PROJECT NO.: 8R00732.1

TESTED FOR:

VTECH ENGINEERING CANADA LTD.
200-7671 ALDERBRIDGE WAY
RICHMOND, B.C.
V6X 1Z9

TESTED BY:

KTL OTTAWA INC.
3325 RIVER ROAD, R.R. 5
OTTAWA, ONTARIO K1V 1H2



NVLAP LAB CODE: 100351-0

JULY 1998

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This report applies only to the items tested.

EQUIPMENT: Cordless Phone

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EQUIPMENT: Cordless Phone

Section 1. Summary Of Test Results

Manufacturer: VTECH Engineering Canada Ltd.

Model No.: VT9111 Family Listed with VT9115

Serial No.: 1

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 FCC Part 15.249. All tests were conducted using measurement procedure ANSI C63.4-1992. Radiated Emissions were made on an open area test site.

New Submission

Production Unit

Class II Permissive Change

Pre-Production Unit

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: *Tom Tidwell*
Tom Tidwell, Senior Technologist

DATE: 29 July 1998

APPROVED BY: *W. Waterhouse*
W. Waterhouse, RF Engineering Lab Manager

DATE: July 31, 1998

EQUIPMENT: Cordless Phone

Summary Of Test Data

Base:

NAME OF TEST	PARA. NO.	RESULT
Conducted Emissions	15.207	Complies
Radiated Emissions	15.249	Complies

Handset:

NAME OF TEST	PARA. NO.	RESULT
Radiated Emissions	15.249	Complies

Footnotes For N/A's:

Test Conditions: Temperature: 25 °C
 Humidity: 51 %

EQUIPMENT: Cordless Phone

Section 2A. General Equipment Specification

Base:

Equipment: Cordless Telephone

Model Number: VT9111

Serial Number: 1

Frequency Range: 902.3 MHz - 905.0 MHz

Operating Frequency(ies) of Sample: 902.3 MHz - 905.0 MHz

Tunable Bands: 1

Number of Channels: 10

Channel Spacing: 300 kHz

Emission Designator: 100KF3E

Crystal Frequencies: 4 MHz

User Frequency Adjustment: Software Controlled

Integral Antenna **Yes** **No**

Note: If antenna is not integral to transmitter explain method of attachment and type of unique connector:

EQUIPMENT: Cordless Phone

Section 2B. General Equipment Specification

Handset

Equipment:	Cordless Telephone				
Model Number:	VT9111				
Serial Number:	1				
Frequency Range:	925.00 MHz - 927.75 MHz				
Operating Frequency(ies) of Sample:	925 MHz, 927.75 MHz				
Tunable Bands:	1				
Number of Channels:	10				
Channel Spacing:	300 kHz				
Emission Designator:	100KF3E				
Crystal Frequencies:	4 MHz				
User Frequency Adjustment:	Software Controlled				
Integral Antenna	<table><tr><td>Yes</td><td>No</td></tr><tr><td><input checked="" type="checkbox"/></td><td><input type="checkbox"/></td></tr></table>	Yes	No	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Yes	No				
<input checked="" type="checkbox"/>	<input type="checkbox"/>				

Note: If antenna is not integral to transmitter explain method of attachment and type of unique connector:

EQUIPMENT: Cordless Phone

Description of Modification for Class II Permissive Change

(1) **Receiver Section:**

Temic U2765B IC is used to replace current discrete mixer (Siemens CF739R) and demodulator IC (Motorola MC13156)

(2) **Transmit Section:**

Used a buffered PLL IC (Toshiba TB31202BFN). Two buffer transistors removed.

(3) **Change of PCB Layout and Shielding:**

The PCB layout and shield can partitions are changed to accommodate Temic IC U2765B

EQUIPMENT: Cordless Phone

Modifications Made During Testing

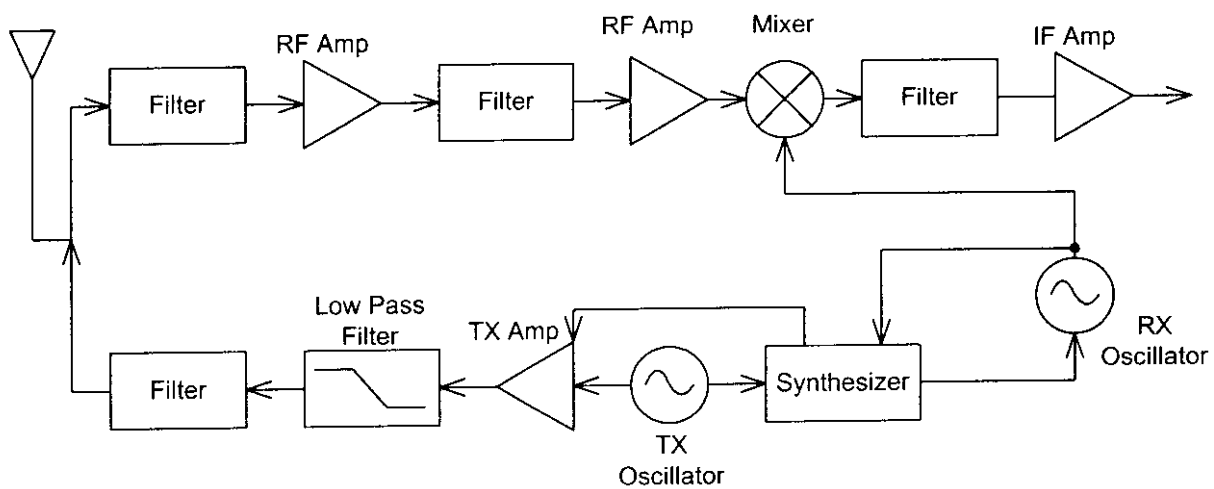
NOT APPLICABLE

EQUIPMENT: Cordless Phone

Theory of Operation

The E.U.T. is an analogue cordless telephone. Modulation is FM. Carrier deviation is ± 25 kHz for voice and ± 40 kHz for MSK administrative data. The base and handset both have permanently attached antennas. The base antenna is a $\frac{1}{2}$ wave antenna with 0 dBi gain while the handset has a $\frac{1}{4}$ wave antenna with -3 dBi gain.

System Diagram



EQUIPMENT: Cordless Phone

Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY: Tom Tidwell	DATE: July 22, 1998

Test Conditions: Standard Temperature and Humidity
 Standard Test Voltage

Minimum Standard:

Frequency (MHz)	Maximum Powerline Conducted RF Voltage	
	(μ V)	(dB μ V)
0.45 - 30.0	250	48

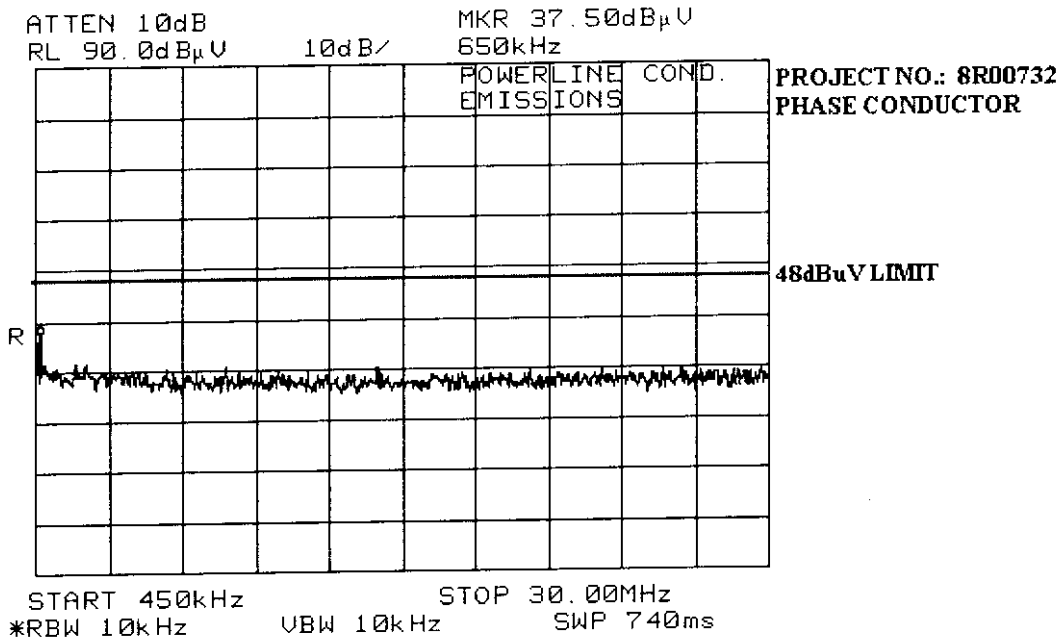
Test Results: Complies. See attached graph(s).

Measurement Data: See attached graph(s).

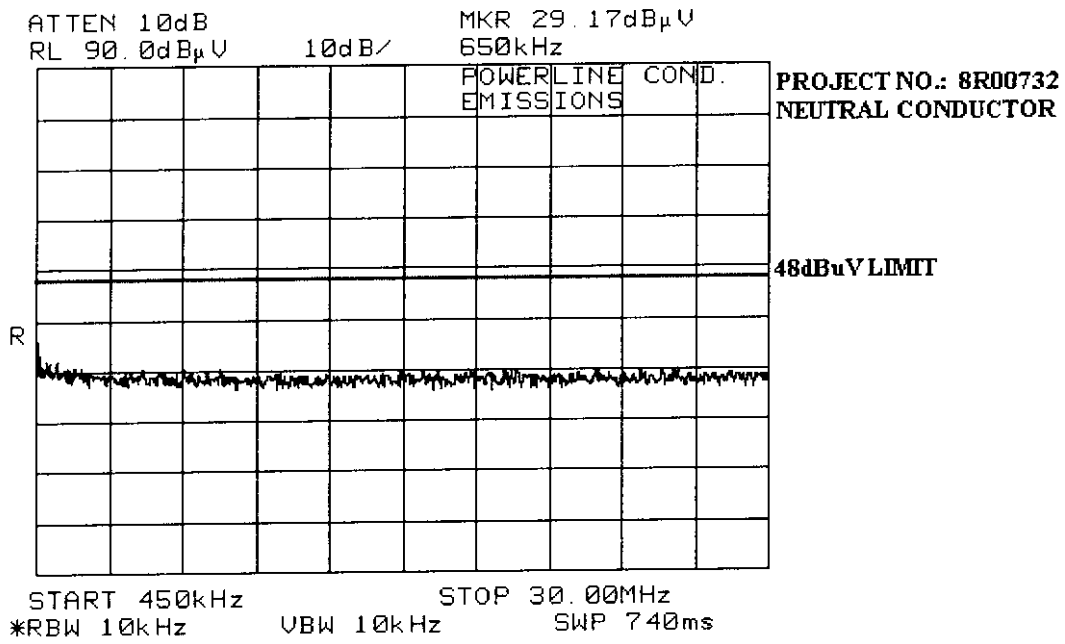
Method of Measurement: (Procedure ANSI C63.4-1992)

Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak Detector. Any emissions that are close to the limit are measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak Detector.

EQUIPMENT: Cordless Phone



EQUIPMENT: Cordless Phone



EQUIPMENT: Cordless Phone

Section 4A. Radiated Emissions (Base)

NAME OF TEST: Radiated Emissions (Base)	PARA. NO.: 15.249
TESTED BY: Tom Tidwell	DATE: July 22, 1998

Test Conditions: Outdoor Range
 Standard Test Voltage

Minimum Standard: Para no. 15.249

(a) The field strengths shall not exceed the following:

Fundamental (MHz)	Field Strength (mV/m)	Field Strength (dBµV)	Harmonic (mV/m)	Harmonic (dBµV)
902-928	50	94	0.5	54

(b) Field strength limits are specified at a distance of 3 metres.

(c) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated limits of 15.209 whichever is the less attenuation.

(d) The emission limits shown above are based on measurement instrumentation employing a CISPR quasi-peak detector below 1000 MHz and an averaging detector above 1000 MHz. However, the peak field strength of any emission shall not exceed the average limit by more than 20 dB.

Test Results: Complies. The worst-case emission level is 88.3 dBµV/m @ 3m at 905.0 MHz. This is 5.7 dB below the specification limit.

Measurement Data: See attached table.

Maximizing Emission Levels:

For hand held equipment or equipment that may be mounted in a variety of positions, the E.U.T. was tested on three orthogonal axis to determine orientation of worst-case emission levels.

EQUIPMENT: Cordless Phone

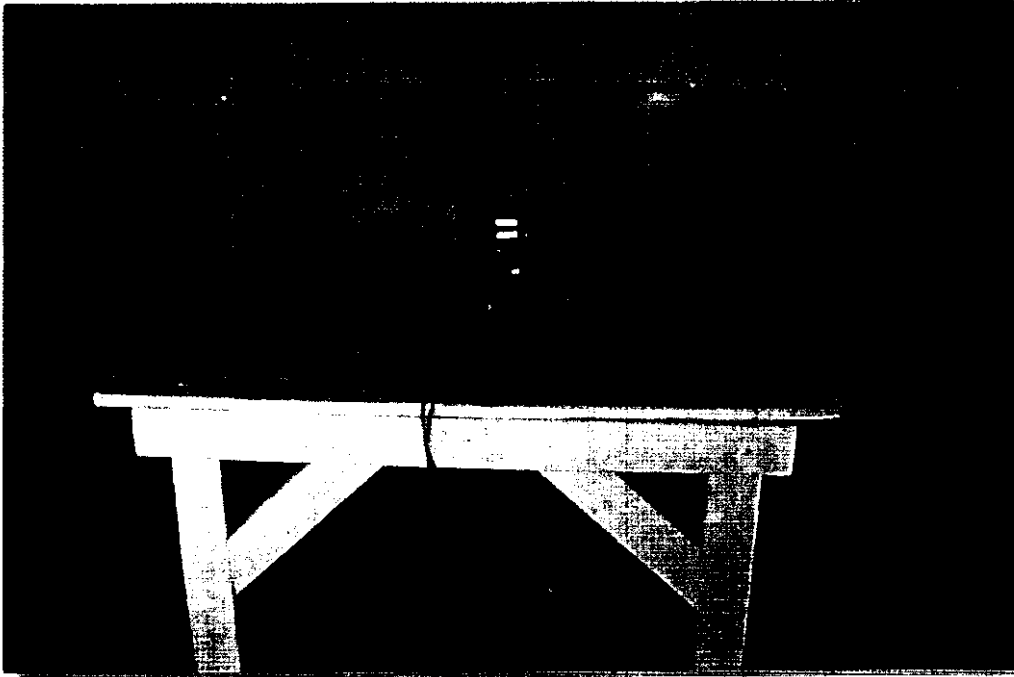
Test Data - Radiated Emissions (Base)

Test Distance (meters) : 3		Range: A Tower		Receiver: HP 8565E Spec A		RBW(kHz): As Per Table		Detector: As Per Table			
Freq. (MHz)	Ant. *	Pol. (V/H)	BW & Det.	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
902.3	E/D4	V	3		52.5	34.5			87.0	94.0	7.0
902.3	E/D4	H	3		53.0	34.5			87.5	94.0	6.5
905.0	E/D4	V	3		53.0	34.5			87.5	94.0	6.5
905.0	E/D4	H	3		53.8	34.5			88.3	94.0	5.7
1804.6	Hrn 2	V	5		52.7	30.9	-45.8		37.8	54.0	16.2
1804.6	Hrn 2	H	5		54.5	30.9	-45.8		36.9	54.0	14.4
2706.9	Hrn 2	V	5		53.0	33.9	-46.0		40.9	54.0	13.1
2706.9	Hrn 2	H	5		49.7	33.9	-46.0		37.6	54.0	16.4
3609.2	Hrn 2	V	5		38.3	40.1	-45.2		33.2	54.0	20.8
3609.2	Hrn 2	H	5		36.5	40.1	-45.2		31.4	54.0	22.6
1810.0	Hrn 2	V	5		53.2	30.9	-45.8		38.3	54.0	15.7
1810.0	Hrn 2	H	5		50.8	30.9	-45.8		35.9	54.0	18.1
2715.0	Hrn 2	V	5		52.7	33.9	-45.9		40.7	54.0	13.3
2715.0	Hrn 2	H	5		53.0	33.9	-45.9		41.0	54.0	13.0

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.
 (1) 120 kHz, Q-Peak, (2) 10 kHz, Peak, (3) 100 kHz RGW, 300 kHz VBW, Peak,
 (4) 300 kHz RBW, 1 MHz VBW, Peak, (5) 1 MHz RBW, 3 MHz VBW, Peak, (6) 1 MHz RBW, 10 Hz VBW, Peak

RADIATED PHOTOGRAPHS (Worst Case)

BASE STATION CONFIGURATION 1

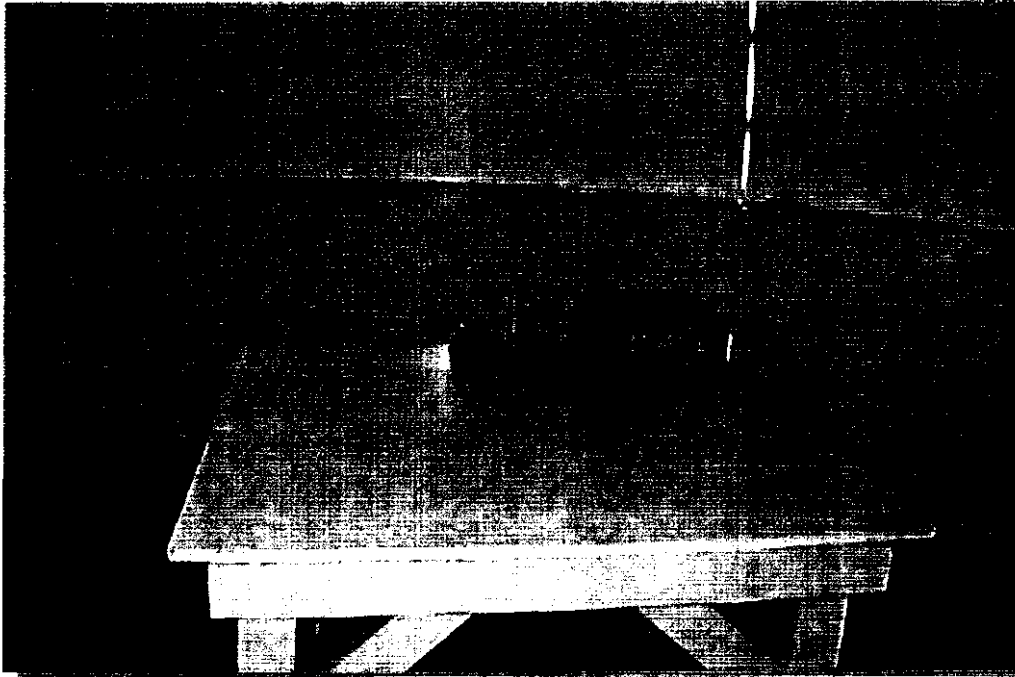


BASE STATION CONFIGURATION 2

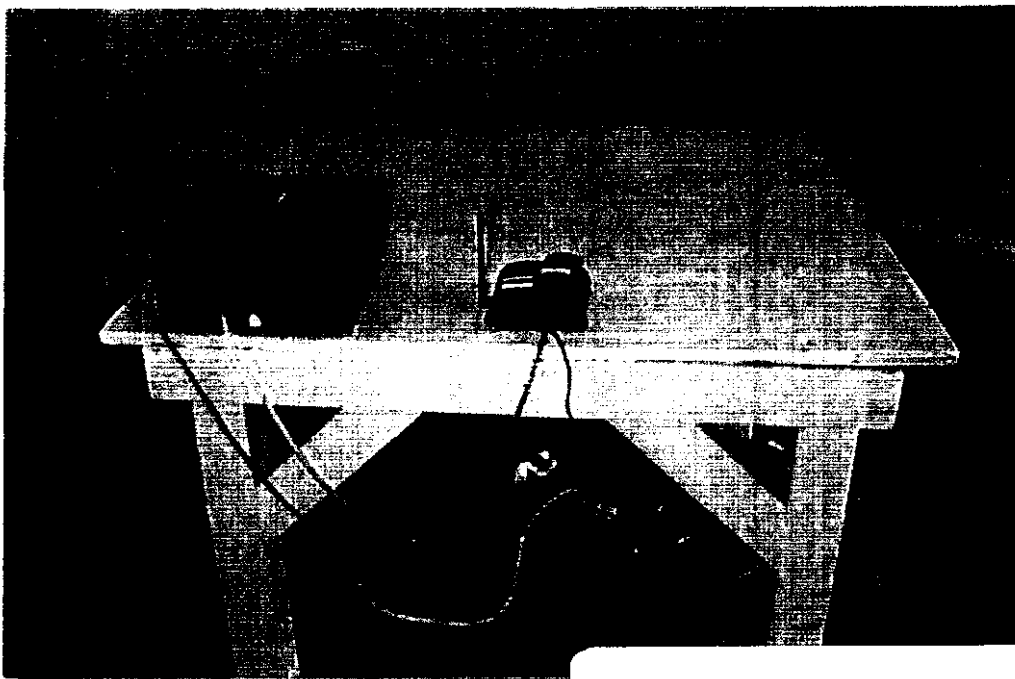


RADIATED PHOTOGRAPHS (Worst Case)

FRONT VIEW



BACK VIEW



EQUIPMENT: Cordless Phone

Section 4B. Radiated Emissions (Handset)

NAME OF TEST: Radiated Emissions (Handset)	PARA. NO.: 15.249
TESTED BY: Tom Tidwell	DATE: July 22, 1998

Test Conditions: Outdoor Range
 Standard Test Voltage

Minimum Standard: Para no. 15.249

(a) The field strengths shall not exceed the following:

Fundamental (MHz)	Field Strength (mV/m)	Field Strength (dBµV)	Harmonic (mV/m)	Harmonic (dBµV)
902-928	50	94	0.5	54

(b) Field strength limits are specified at a distance of 3 metres.

(c) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated limits of 15.209 whichever is the less attenuation.

(d) The emission limits shown above are based on measurement instrumentation employing a CISPR quasi-peak detector below 1000 MHz and an averaging detector above 1000 MHz. However, the peak field strength of any emission shall not exceed the average limit by more than 20 dB.

Test Results: Complies. The worst-case emission level is 83.9 dBµV/m @ 3m at 925.05 MHz. This is 10.1 dB below the specification limit.

Measurement Data: See attached table.

Maximizing Emission Levels:

For hand held equipment or equipment that may be mounted in a variety of positions, the E.U.T. was tested on three orthogonal axis to determine orientation of worst-case emission levels.

EQUIPMENT: Cordless Phone

Test Data - Radiated Emissions (Handset)

Test Distance (meters) : 3		Range: A Tower		Receiver: HP 8565 Spec A		RBW(kHz): As Per Table		Detector: As Per Table			
Freq. (MHz)	Ant. *	Pol. (V/H)	BW & Det.	Table (deg.)	RCVD Signal (dBμV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
925.05	E/D4	V	3		49.0	34.9			83.9	94.0	10.1
925.05	E/D4	H	3		46.8	34.9			81.7	94.0	12.3
927.75	E/D4	V	3		47.7	34.9			82.6	94.0	11.4
927.75	E/D4	H	3		45.8	34.9			80.7	94.0	13.3
1850.1	Hrn 2	V	5		40.7	31.3	-45.9		26.1	54.0	27.9
1850.1	Hrn 2	H	5		38.5	31.3	-45.9		23.9	54.0	30.1
2775.15	Hrn 2	V	5		46.8	34.2	-45.8		35.2	54.0	18.8
2775.15	Hrn 2	H	5		48.5	34.2	-45.8		36.9	54.0	17.1
1855.5	Hrn 2	V	5		39.3	31.3	-45.9		24.7	54.0	29.3
1855.5	Hrn 2	H	5		48.2	31.3	-45.9		33.6	54.0	20.4
2783.25	Hrn 2	V	5		46.5	34.2	-45.8		34.9	54.0	19.1
2783.25	Hrn 2	H	5		48.0	34.2	-45.8		36.4	54.0	17.6

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.

(1) 120 kHz, Q-Peak, (2) 10 kHz, Peak, (3) 100 kHz RGW, 300 kHz VBW, Peak,

(4) 300 kHz RBW, 1 MHz VBW, Peak, (5) 1 MHz RBW, 3 MHz VBW, Peak, (6) 1 MHz RBW, 10 Hz VBW, Peak

EQUIPMENT: Cordless Phone

Section 5. Test Equipment List

Equipment List - Conducted Emissions - Shielded Room #2

CAL Cycle	Equipment	Manufacturer	Model #	Serial/Asset #	Last Cal.	Next Cal.
1 Year	LISN	Tegam	95300-50	T-128556	July 24/97	July 24/98
1 Year	Spectrum analyzer	Hewlett-Packard	8565E	FA000981	May 20/98	May 20/99
	Plotter	Hewlett-Packard	7470A	2210A08836	N/A	N/A

Equipment List - Radiated Emissions

CAL Cycle	Equipment	Manufacturer	Model #	Serial/Asset #	Last Cal.	Next Cal.
	Biconilog Antenna	EMCO	3143	9404-1039	NCR	NCR
1 Year	Dipole Antenna Set	EMCO	3121C	1029	Oct. 28/97	Oct. 28/98
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	Mar. 31/98	Mar. 31/99
1 Year	Spectrum Analyzer	Hewlett-Packard	8565E	FA000981	May 20/98	May 20/99
2 Year	Horn Antenna	EMCO	3115	4336	Oct. 30/97	Oct. 30/99
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Oct. 24/97	Oct. 24/98

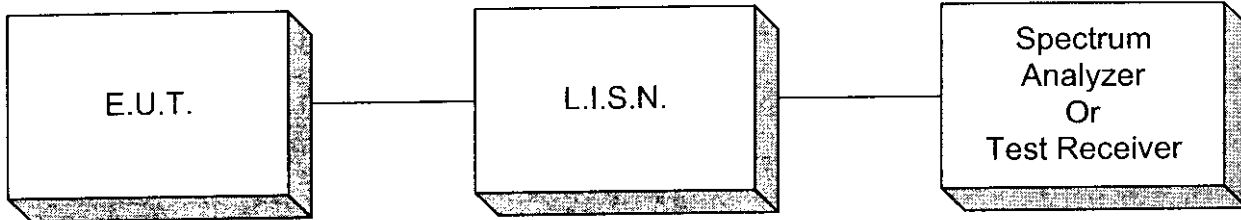
Note: N/A = Not Applicable
 NCR = No Cal Required

EQUIPMENT: Cordless Phone

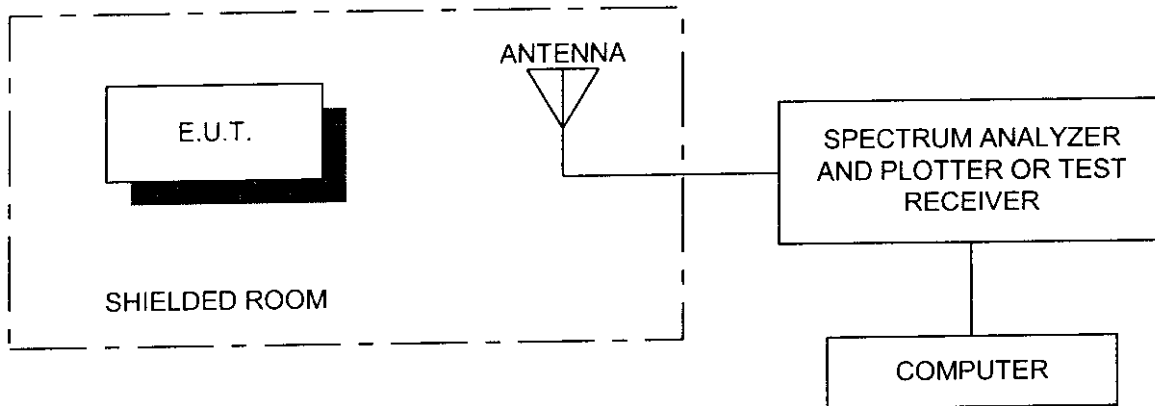
ANNEX A
TEST DIAGRAMS

EQUIPMENT: Cordless Phone

Conducted Emissions

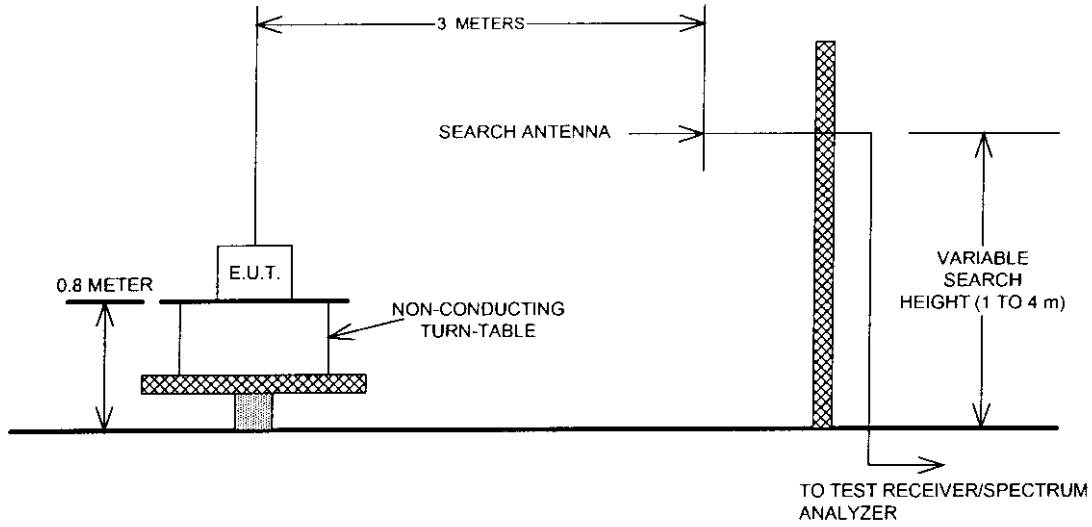


Radiated Prescan



EQUIPMENT: Cordless Phone

Test Site For Radiated Emissions



KTL Ottawa

FCC PART 15, SUBPART C
FOR 900 MHz CORDLESS TELEPHONES
PROJECT NO.: 8R00732.1
ANNEX B

EQUIPMENT: Cordless Phone

ANNEX B

RESTRICTED BANDS OF OPERATION

EQUIPMENT: Cordless Phone

Section B Restricted Bands of Operation

(a) Except as shown in paragraph (d) of this section , only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.15
0.49 - 0.51	16.69475-16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425-16.80475	960-1240	7.25-7.75
3.020 - 3.026	25.5-25.67	1300-1427	8.025-8.5
4.125 - 4.128	37.5-38.25	1435-1626.6	9.0-9.2
4.17725 - 4.17775	73-74.6	1645.5-1646.5	9.3-9.5
4.20725 - 4.20775	74.8-75.2	1660-1710	10.6-12.7
6.215 - 6.218	108-121.94	1718.8-1722.2	13.25-13.4
6.31175 - 6.31225	123-138	2220-2300	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			