

KTL Test Report: 0R03098.1

Applicant: Nortel Networks
2351 Blvd. Alfred Nobel
St. Laurent, Quebec
H4S 2A9

**Equipment Under Test:
(E.U.T.)** Small Antenna

In Accordance With: **FCC Part 15, Subpart C**
For Low Power Transmitters Operating Periodically
In The Band 40.66 - 40.77 MHz And Above 70 MHz

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

Authorized By:



G. Westwell, Technologist

Date: November 3, 2000

Total Number of Pages: 18

Authorized Copy: Soft Copy

EQUIPMENT: Small Antenna

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Section 1. Summary of Test Results

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 15.231. All tests were conducted using measurement procedure 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.

New Submission

Production Unit

Class II Permissive Change

Pre-Production Unit

D	X	T
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Equipment Code

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

Russell Grant

TESTED BY:

Russell Grant, Wireless Group Manager

DATE: November 3, 2000

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This report applies only to the items tested.

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Summary Of Test Data

Name of Test	Para. Number	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	Not Applicable
Periodic Alternate Field Strength Requirements	15.231(e)	Not Applicable
Powerline Conducted Emissions	15.207	Not Applicable

Footnotes For N/A's:

DC Powered

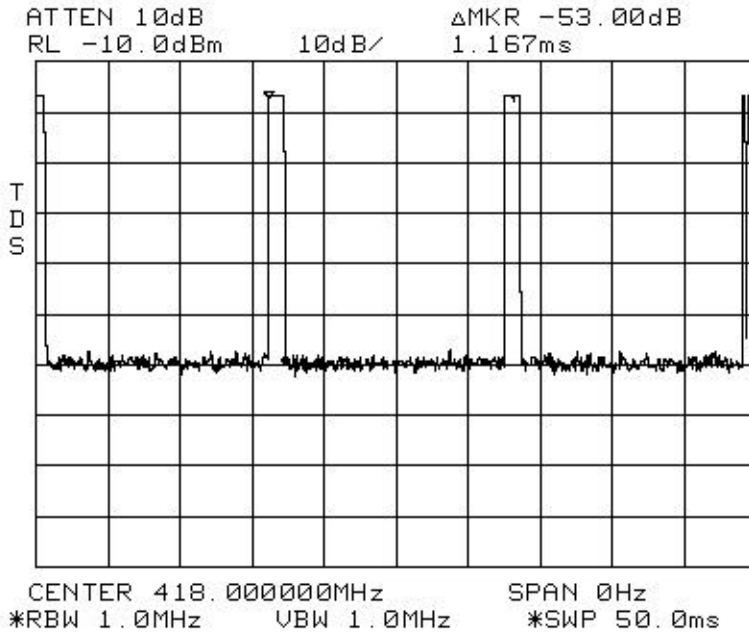
EQUIPMENT: Small Antenna

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

General Equipment Information

Manufacturer:	Nortel Networks
Date Received In Laboratory:	October 2, 2000
KTL Identification No.:	Item #1
Frequency Range:	418 MHz
Operating Frequency(ies) of Sample:	418 MHz
Emission Designator:	80K0K1D
Supply Power Requirement:	Batteries
Duty Cycle Calculation:	$20 \log \left(\frac{7 \times 1.167}{100} \right) = -21.8 \text{ dB}$

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Section 3. Transmission Requirements

Para. No.: 15.231(a)

Test Performed By: Russell Grant	Date of Test: October 27, 2000
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Minimum Standard: 15.231(a) Continuous transmissions such as voice, video or data transmissions are not permitted.

15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds after being released.

15.231(a)(2) A transmitter activated automatically shall cease transmission within 5 seconds of activation.

15.231(a)(3) Periodic transmissions at regular pre-determined intervals are not permitted. However polling or supervisory transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

15.231(a)(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm.

Test Results: Complies.

Test Data: Compliance was determined by verification of technical specifications and a functional test on the equipment.

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Rationale for Compliance with Transmission Requirements

15.231(a)(1) : The transmitter is automatically deactivated 368ms after turn on.
This is the maximum transmit time.

15.231(a)(2) : No automatic activation.

15.231(a)(3) : No periodic transmission.

15.231(a)(4) : Not applicable.

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Section 4. Radiated Emissions

Para. No.: 15.231(b)

Test Performed By: Russell Grant	Date of Test: October 27, 2000
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Minimum Standard:

Permissible Field Strength Limits (Momentarily Operated Devices)

Fundamental Frequency (MHz)	Field Strength of Fundamental Microvolts/Meter at 3 meters; (watts)	Field Strength of Unwanted Emissions Microvolts/Meter at 3 meters; (watts)
40.66 - 40.70	2,250	225
70-130	1, 250	125
130-174	1,250 to 3,750*	125 to 375
174-260 (note 1)	3,750	375
260-470 (note 1)	3,750 to 12,500*	375 to 1,250
Above 470	12,500	1,250

Notes:

# Use quasi-peak or averaging meter.	For 130 - 174 MHz: $FS \text{ (microvolts/m)} = (56.82 \times F) - 6136$
* Linear interpolation with frequency F in MHz	For 260 - 470 MHz: $FS \text{ (microvolts/m)} = (41.67 \times F) - 7083$

Any emissions that fall within the restricted bands of 15.205 shall not exceed the following 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

Test Results: Complies. The worst-case emission level is 57.9 dB $\mu\text{V/m}$ @ 3m at 418.03 MHz. This is 22.4 dB below the specification limit.

Test Data: See attached table.

Above 1 GHz a spectrum analyzer and low noise amplifier are used to measure emission levels. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was 3 MHz.

In the case of handheld equipment, the E.U.T. is rotated in three planes to obtain worst-case results.

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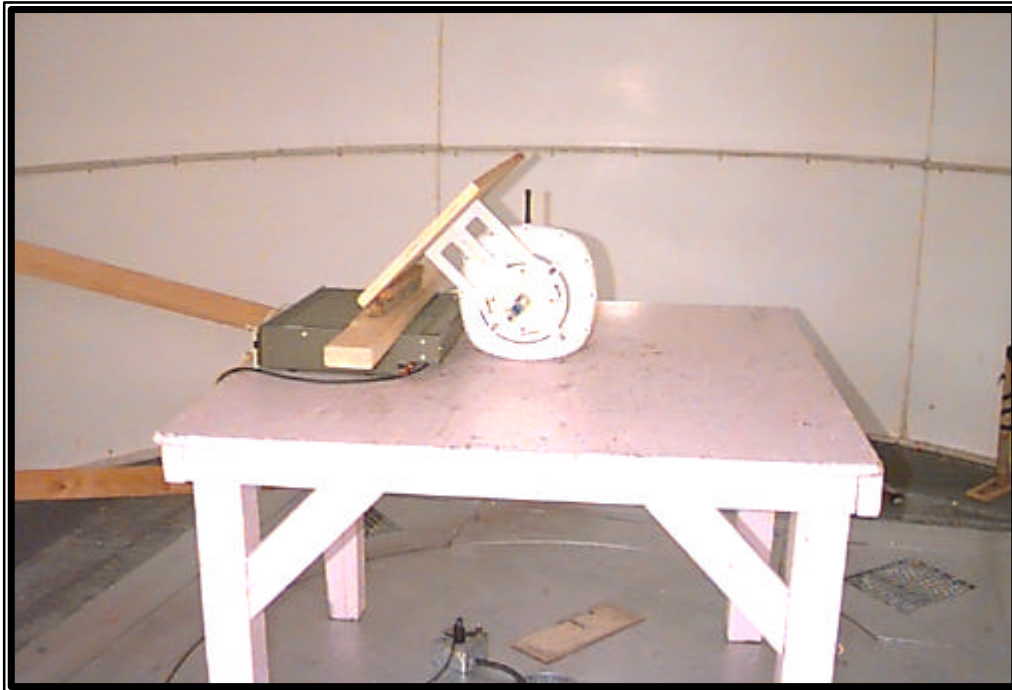
Test Data - Radiated Emissions

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP		RBW(kHz): 100		Detector: Peak	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Duty Cycle (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
418.03	E/D4	V	53.3	24.6		-20.0	57.9	80.3	22.4
418.03	E/D4	H	44.0	24.6		-20.0	48.6	80.3	31.7
<p>No transmitter spurious emissions were detected within 20 dB of the specification limit. The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.</p>									
<p>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. N.D. = Not Detected</p>									

EQUIPMENT: Small Antenna

Radiated Photographs (Worst Case Configuration)

Side View



EQUIPMENT: Small Antenna

Section 5. Occupied Bandwidth

Para. No.: 15.231(c)

Test Performed By: Russell Grant	Date of Test: October 27, 2000
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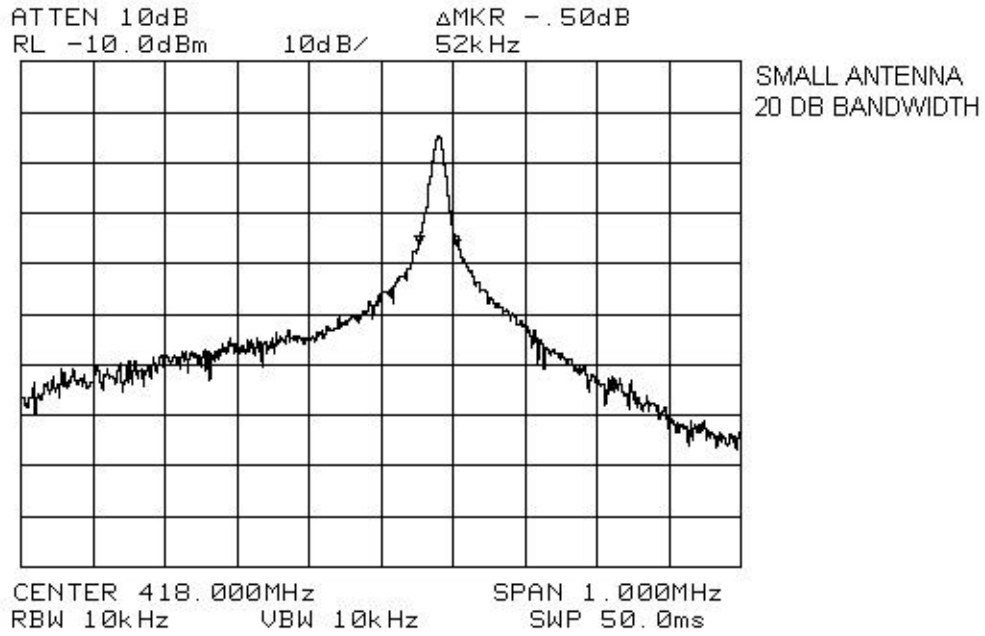
Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: Complies. See attached graph.

The 20 dB bandwidth is 52 kHz. This is 0.0120% of the centre frequency.

Test Data: See attached graph.

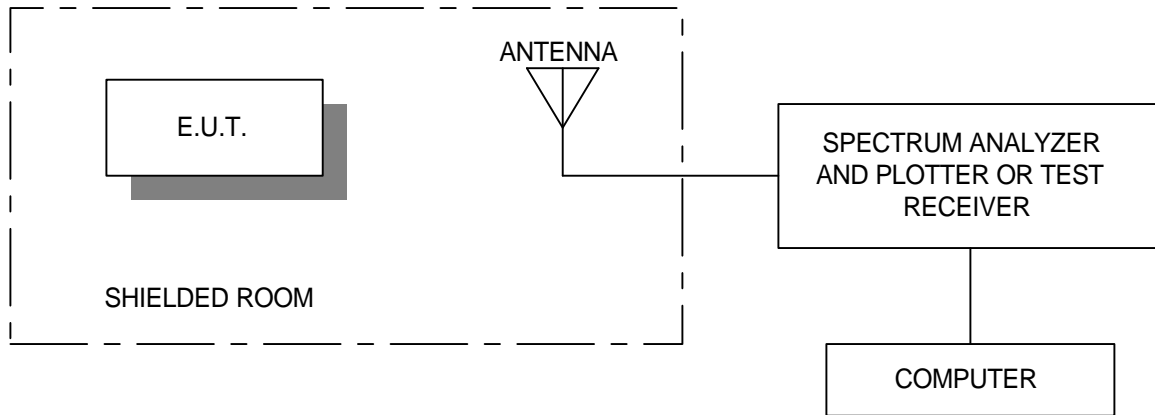
EQUIPMENT: Small Antenna



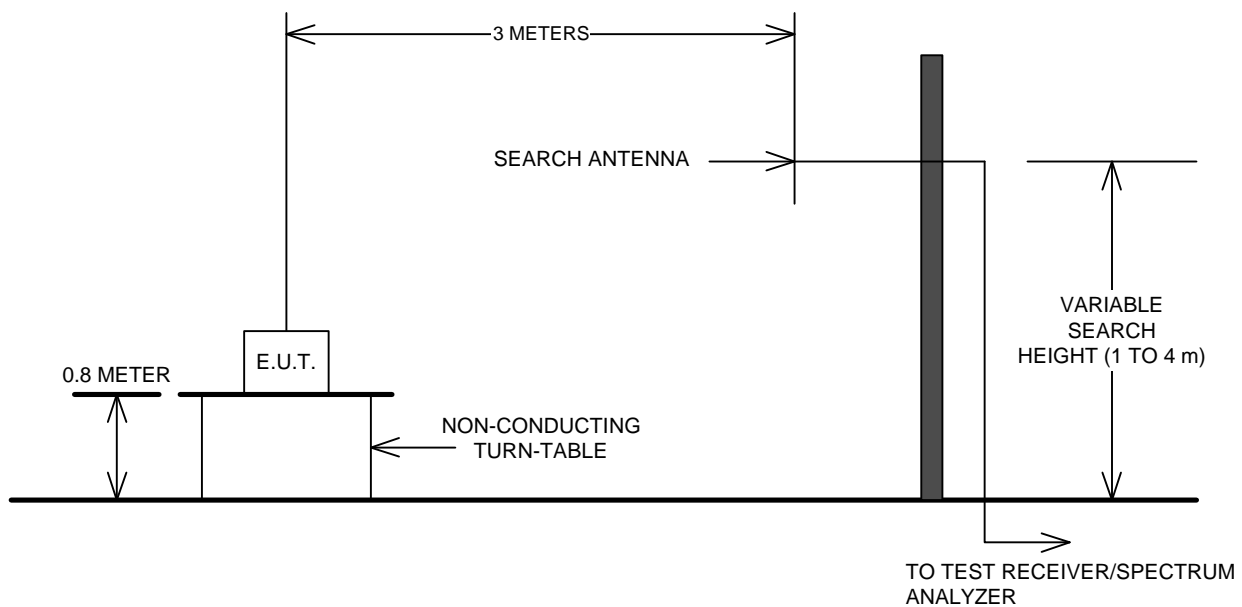
EQUIPMENT: *Small Antenna*

Section 6. Block Diagrams

Radiated Prescan



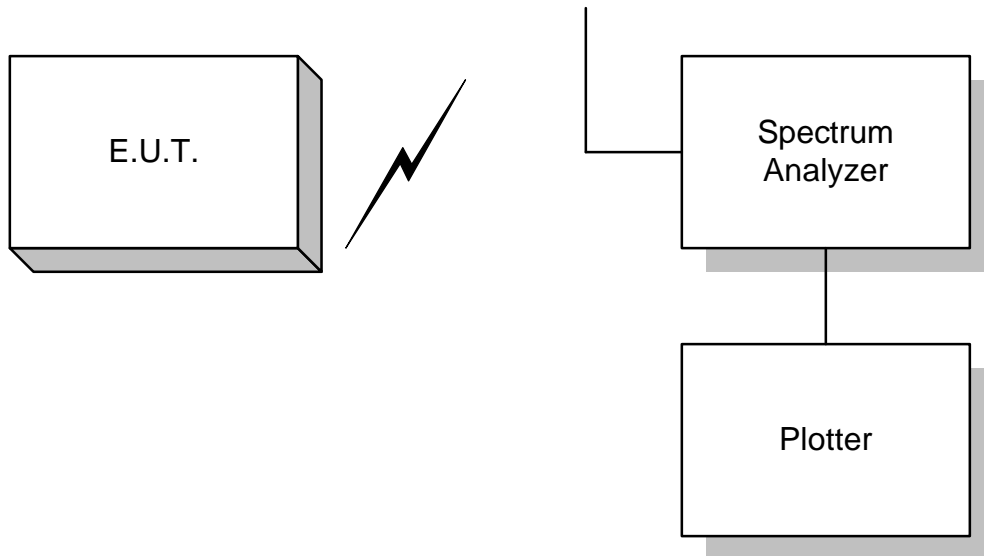
Outdoor Test Site For Radiated Emissions



The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.

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Occupied Bandwidth



EQUIPMENT: Small Antenna

Section 7. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Spectrum Analyzer-1	Hewlett Packard	8566B	2311A02238	Nov. 6/99	Nov. 6/00
1 Year	Spectrum Analyzer Display-1	Hewlett Packard	8566B	2314A04759	Nov. 6/99	Nov. 6/00
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	April 5/00	April 5/01
	Biconilog Antenna	EMCO	3143	1038	NCR	NCR
1 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 11/99	Nov. 11/00
1 Year	Dipole Antenna Set	EMCO #2	3121C	FA001349	June 27/00	June 27/01
1 Year	RF AMP	JCA	2-4 GHz	FA001496	May 31/00	May 31/01
1 Year	RF AMP	JCA	1-2 GHz	FA001498	May 31/00	May 31/01
1 Year	RF AMP	JCA	4-8 GHz	FA001497	May 31/00	May 31/01

NA: Not Applicable
 NCR: No Cal Required
 COU: CAL On Use