



Nemko Test Report: 5L0526RUS2

Applicant: Nokia, Inc.

**Equipment Under Test:
(E.U.T.)** 6165i

FCC ID: QMNRM-125

In Accordance With: **FCC Part 15, Subpart C, 15.247**
Frequency Hopping Transmitters

Tested By: Nemko USA Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

Authorized By:

Kevin Rose, Wireless Engineer

Date: November 15, 2005

NVLAP LAB CODE: 100426-0
Accreditation valid 1/1/05 to 12/31/05



Table of Contents

Section 1.	Summary of Test Results	3
Section 2.	Equipment Under Test (E.U.T.)	5
Section 3.	Powerline Conducted Emissions	6
Section 4.	EIRP	10
Section 5.	Spurious Emissions (Radiated)	12
Section 6.	Test Equipment List	15
ANNEX A - TEST DETAILS		16
ANNEX B - TEST DIAGRAMS		19

Section 1. Summary of Test Results

Manufacturer: Nokia, Inc.
Model No.: 6165i
Serial No.: 033/10858381
Type: RM-125

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 C63.4-2003. 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

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: 100426-0

Nemko USA Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko USA Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report applies only to the items tested.

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a)	Complies
Channel Separation	15.247(a)(1)	Not Tested
Pseudorandom Hopping Algorithm	15.247(a)(1)	Not Tested
Time of Occupancy	15.247(a)(1)(ii)	Not Tested
20 dB Occupied Bandwidth	15.247(a)(1)	Not Tested
Peak Power Output	15.247(b)	Complies
Spurious Emissions (Antenna Conducted)	15.247(c)	Not Tested
Spurious Emissions (Radiated)	15.247(c)	Complies

Footnotes: **Items marked as “Not Tested” were tested by Nokia**

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

General Equipment Information

Frequency Band: 2402 to 2480 MHz

Number of Channels: 79

Channel Spacing: 1 MHz

User Frequency Adjustment: Software controlled

Section 3. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: David Light	DATE: 11/3/2005

Test Results: Complies.

Measurement Data: See attached plots.

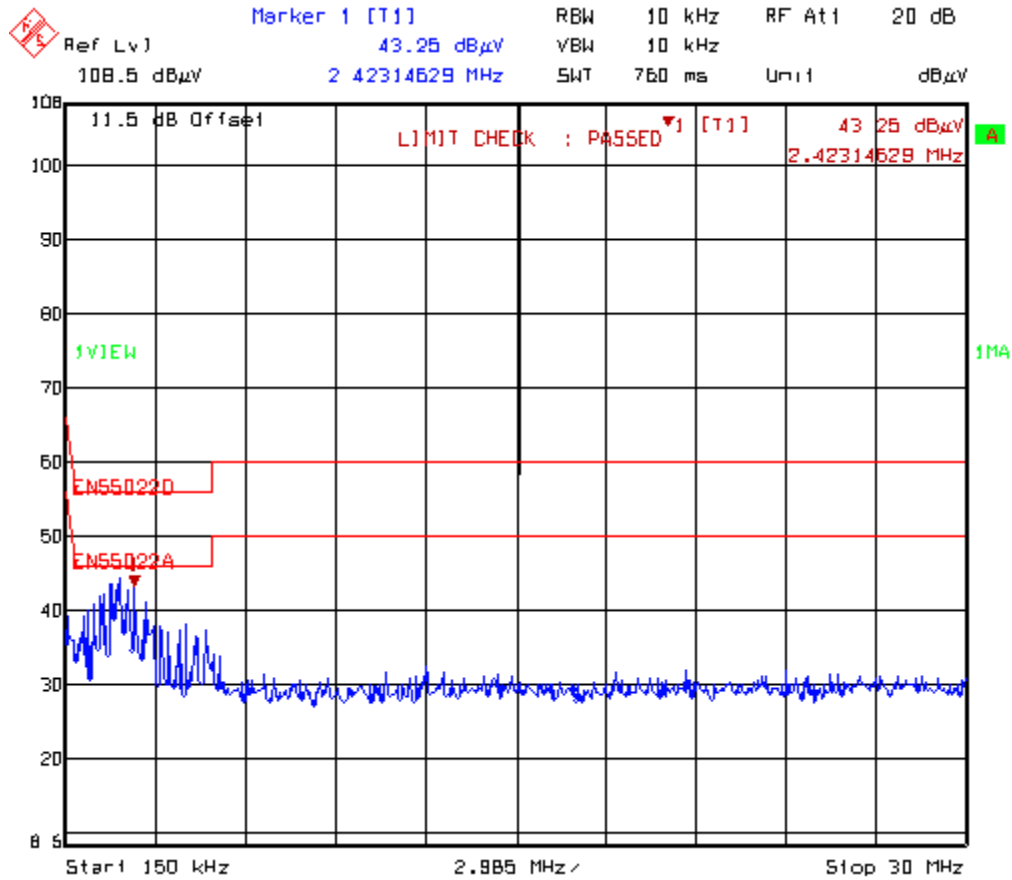
Equipment Used: 1258-1433-1534-674-1036

Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

Relative Humidity: 45 %

Test Data – Powerline Conducted Emissions



Neutral

Test Setup Photos



Section 4. EIRP

NAME OF TEST: EIRP	PARA. NO.: 15.247(b)(3)
TESTED BY: David Light	DATE: 11/15/2005

Test Results: Complies.

Equipment Used: 1484-1485-1464-993

Measurement Uncertainty: +/- 1.7 dB

Temperature: 20 °C

Relative Humidity: 30 %

The handset was tested on three orthogonal axis'.

Test Data – EIRP

Field Strength of Spurious Emissions										
Page <u>1</u> of <u>1</u> Job No.: <u>5L0526</u> Specification: <u>15.247</u> Tested By: <u>David Light</u> E.U.T.: <u>Tri-mode/Bluetooth handset</u> Configuration: <u>Tx BT</u> Sample No.: <u>1</u> Location: <u>AC 3</u> Detector Type: <u>Peak</u> Date: <u>11/15/05</u> Temperature(°C): <u>20</u> Relative Humidity(%) <u>30</u> RBW: <u>1 MHz</u> VBW: <u>1 MHz</u> Complete <u>X</u> Preliminary _____ Measurement Distance: <u>3</u> m										
Test Equipment Used Antenna: <u>993</u> Pre-Amp: _____ Filter: _____ Receiver: <u>1464</u> Attenuator #1: _____ Attenuator #2: _____ Additional equipment used: _____ Measurement Uncertainty: <u>+/-1.7 dB</u> Directional Coupler: _____ Cable #1: <u>1484</u> Cable #2: <u>1485</u> Cable #3: _____ Cable #4: _____ Mixer: _____										
Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBi)		EIRP (dBm)	EIRP (mW)	Polarity	Comments
2480	-45.2	34.9			7.8		-2.5	0.5675	V	
2480	-50.5	36.8			5.6		-8.1	0.1563	H	
2440	-44.2	34.9			7.8		-1.5	0.7145	V	
2440	-53.2	36.8			5.6		-10.8	0.0839	H	
2402	-44.8	34.9			7.8		-2.1	0.6223	V	
2402	-53.8	36.8			5.6		-11.4	0.0731	H	
Notes: _____										

Section 5. Spurious Emissions (Radiated)

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.247(c)
TESTED BY: David Light	DATE: 11/3/2005

Test Results: Complies.

Measurement Data: There were no emissions detected above the noise floor which is at least 20 dB below the specification limit of 74 dB μ V/m. Peak or 54 dB μ V/m Average. 1 MHz RBW/VBW for peak readings, 1 MHz RBW/1 MHz VBW with duty cycle correction was used for average measurement.

The worst case emission was 50 dB μ V/m. at 2483.5 MHz in the horizontal polarity with the handset transmitting at 2480 MHz.

Duty Cycle Calculation:

Duty Cycle correction factor(dB) = $20 \log (rf_{ON} \text{ in ms}/100\text{ms})$

Equipment Used: 1484-1485-1464-1016-993

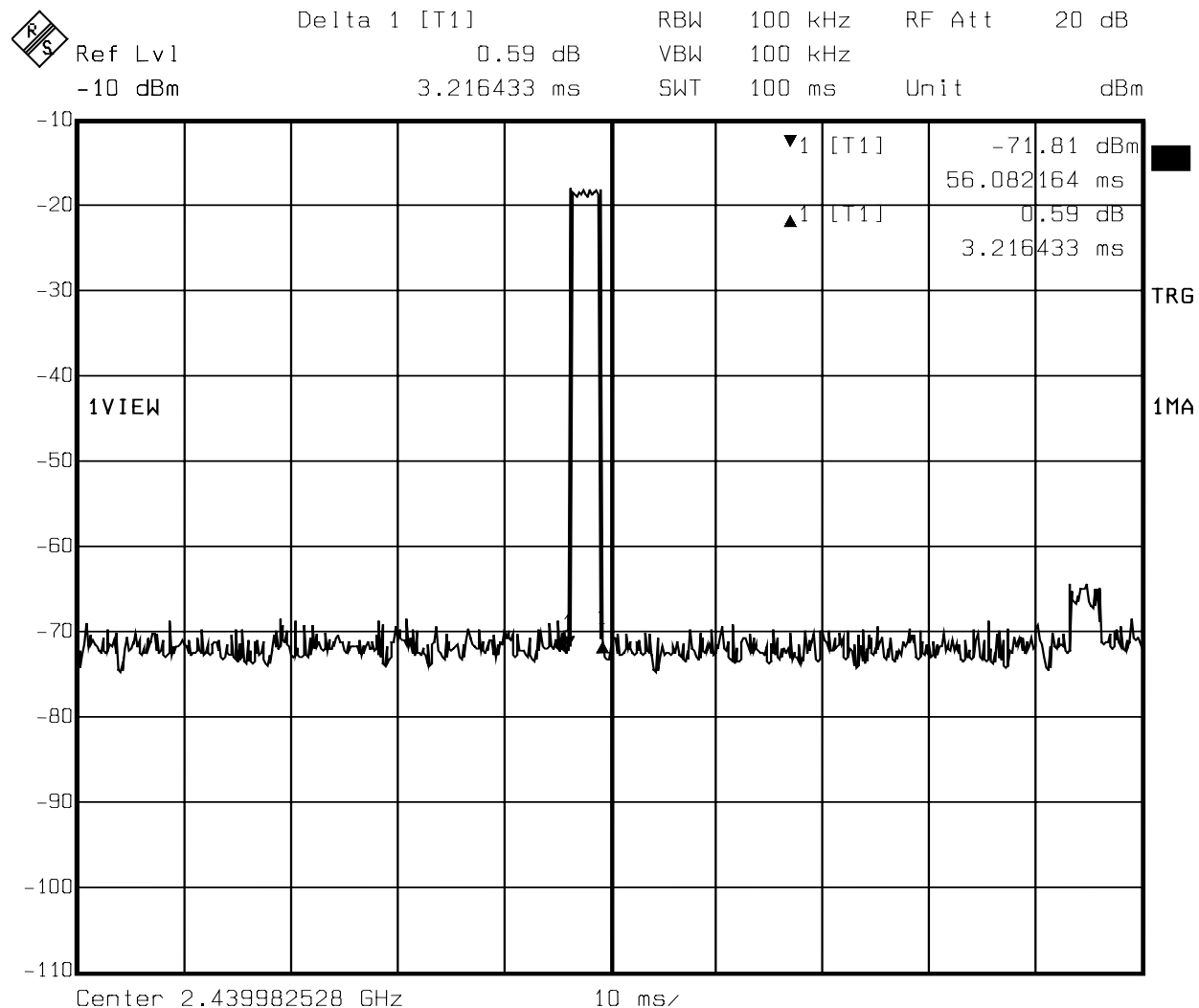
Measurement Uncertainty: +/- 3.7 dB

Temperature: 22 °C

Relative Humidity: 45 %

The handset was tested on three orthogonal axis'.

Test Data – Duty Cycle (Normal Hop Mode)



Date: 03.NOV.2005 11:46:18

Duty cycle correction = $20 \log_{10} (\text{Time On mS}/100 \text{ mS})$ $20 \log_{10} (6.22/100) = -29.8 \text{ dB}$

Radiated Photographs



Section 6. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	09/15/05	09/15/06
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	09/15/05	09/15/06
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	11/12/04	11/12/05
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
1258	LISN .15mhz-30mhz	EMCO 0	1305	11/17/04	11/17/05
1433	High pass filter	Solar 7930-5.0	933142	09/07/05	09/07/06
1534	CABLE, 9M	KTL RG223	NA	08/10/05	08/10/06
674	LIMITER	HP 11947A	3107A02200	CBU	CBU
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	03/22/04	03/23/06

Nemko USA, Inc.

FCC PART 15, SUBPART C

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: 6165i

Test Report No.: 5L0526RUS2

ANNEX A - TEST DETAILS

NAME OF TEST: Powerline Conducted Emissions

PARA. NO.: 15.207(a)

Specification Limits:

Limits for conducted disturbance at the mains ports

Frequency Range (MHz)	Quasi-peak Limits (dBuV)	Average Limits (dBuV)
0.15 to 0.50	66-56	56-46
0.50 to 5.00	56	46
5.00-30.0	60	50
The limit decreases with the logarithm of the frequency in the range 0.15MHz to 0.5 MHz		

Method of Measurement (Procedure ANSI C63.4-2003):

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 9 or 10 kHz bandwidth, CISPR Quasi-Peak detector.

NAME OF TEST: Radiated Spurious Emissions

PARA. NO.: 15.247(c)

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, 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

Nemko USA, Inc.

FCC PART 15, SUBPART C

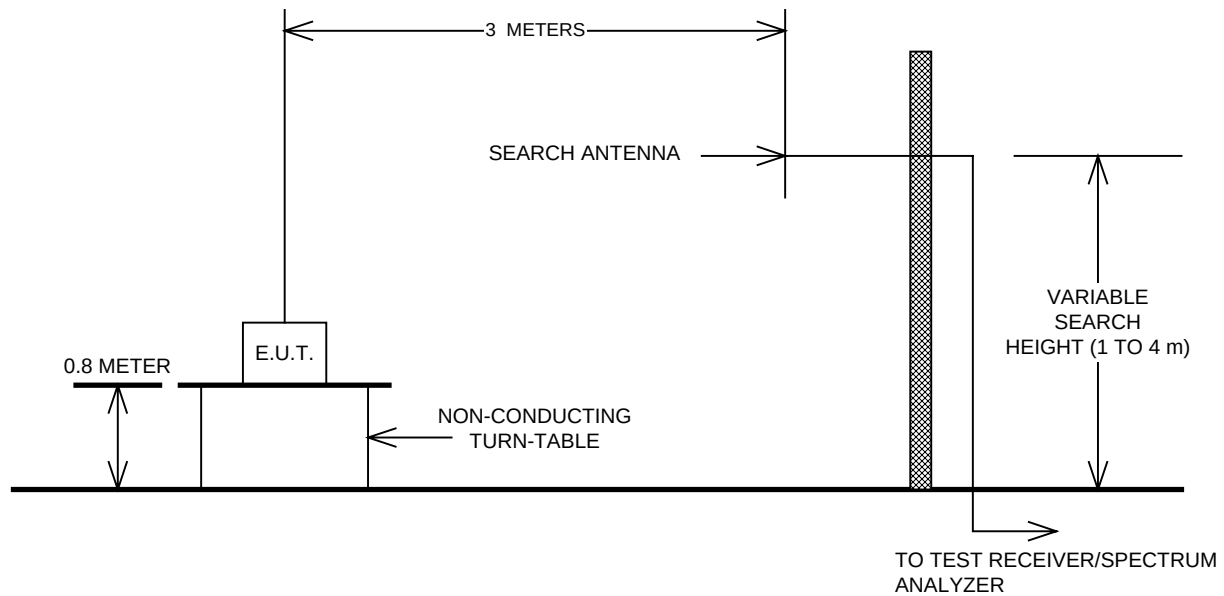
FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

EQUIPMENT: 6165i

Test Report No.: 5L0526RUS2

ANNEX B - TEST DIAGRAMS

Test Site For Radiated Emissions



Conducted Emissions

