CFR 47 Part 2, 22 Test Report

Test Report Number: WR583.002

Terminal device: FCC ID: QMNRM-61 Model: 3152 Type: RM-61 HW: 3103 SW: Q100_04w47_11.nbr (Detailed information is listed in section 4).

Originator:	Mark Severson
Function:	TCC - Dallas – EMC
Version/Status:	1.0 Approved
Location:	TCC Directories
Date:	April 29, 2005

Change History:

Version	*Date*	*Status*	*Handled By*	*Comments*
0.1	4/18/05	Draft	Darreyl Roberts	
0.2	4/29/05	Proposal	Mark Severson	
0.3	4/29/05	Reviewed	Mark Severson	
1.0	4/29/05	Approved	Nerina Walton	

Testing laboratory:

Test & Certification Center (TCC) Dallas
Nokia Inc
6021 Connection Drive
Irving, Texas 75039
U.S.A.

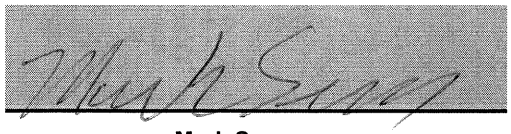
Tel. 972-894-5000

Client:

Nokia Inc.
San Diego
12278 Scripps Summit Dr.
San Diego
CA 92131
USA
Tel. +1858 831 5000
Fax. +1 858 831 6500

Date and signatures: **April 29, 2005**

For the contents:



Mark Severson
Technical Review

Nerina Walton
Manager Review

TABLE OF CONTENTS

1. GENERAL

1.1 Quality System

The quality system in place for TCC-Dallas conforms to ISO/IEC 17025 and has been audited to the standard by A2LA (American Association of Laboratory Accreditation). TCC - Dallas has also been audited using the ISO 9000 Quality System, as part of Nokia Mobile Phones, Inc., by ABS (American Bureau of Shipping) Quality Evaluations Inc.

TCC-Dallas is a recognized laboratory with the Federal Communications Commission in filing applications for Certification under Parts 15 and 18, Registration Number 100060, and Industry Canada, Registration Number IC 661.

1.2 List of General Information Required for Certification

This list is in accordance with FCC Rules and Regulations, CFR 47, Part 2, and to 22H, 24E, Confidentiality.

1.2.1 Sub-part 2.1033(c)(1)

Name and Address of Applicant:

Nokia Inc.
San Diego
12278 Scripps Summit Dr.
San Diego
CA 92131
USA
Tel. +1858 831 5000
Fax. +1 858 831 6500

Manufacturer:

Nokia Inc.
San Diego
12278 Scripps Summit Dr.
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CA 92131
USA
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Fax. +1 858 831 6500

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: QMNRM-61

Model No: 3152

1.2.3 Sub-part 2.1033(c)(3)

Instruction Manual(s): Refer to attached EXHIBITS

1.2.4 Sub-part 2.1033(c)(4)

Type of Emission: 40K0F1D, 40K0F8W, 1M25F9W

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: 824.04-848.97MHz

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: 0.316W Cellular

☐ Switchable ☒ Variable ☐ N/A

FCC Grant Note: BC- The output power is continuously variable from the value listed in this entry to 5%-10% of the value listed.

1.2.7 Sub-part 2.1033(c)(7)

Maximum Power Rating, Watts: 0.316W

1.2.8 Sub-part 2.1033(c)(8)

Voltages & Currents in all elements in final R.F. Stage, including final transistor or solid-state device:
Collector Current, A = 0.85
Collector Voltage, Vdc = 3.7
Supply Voltage, Vdc = 3.7

1.2.9 Sub-part 2.1033(c)(9)

Tune-up Procedure: Refer to attached EXHIBITS

1.2.10 Sub-part 2.1033(c)(10)

Circuit Diagram/Circuit Description:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.
Refer to attached EXHIBITS

1.2.11 Sub-part 2.1033(c)(11)

Label Information: Refer to attached EXHIBITS

1.2.12 Sub-part 2.1033(c)(12)

Photographs: Refer to attached EXHIBITS

1.2.13 Sub-part 2.1033(c)(13)

Digital Modulation Description: N/A

1.2.14 Sub-part 2.1033(c)(14)

Test and Measurement Data: FOLLOWS

1.3 Objective

All tests and measurement data shown was performed to determine whether the selected handset was in compliance as specified in FCC: CFR47 Parts 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057 and Part 22.

1.4 Test Summary

Test Results: *The test result relates only to those tested devices mentioned in Section 4 of this test report.*

Test Performed	Reference	Section of Report	Complies / Does not comply / Not Tested
RF Power Output (Conducted)	FCC Part 2.1046(a) / 22.913(a)	6	Complies
RF Power Output (Radiated)	FCC Part 22.913(a)	7	Complies
Occupied Bandwidth: Transmitter Conducted Measurements	FCC Part 2.1049(c)(1)	8	Complies
Spurious Emissions at Antenna Terminals	FCC Part 2.1051	9	Complies
Field Strength of Spurious Radiation	FCC Part 2.1053	10	Complies
Frequency Stability (Temperature Variation)	FCC Part 2.1055(a)(1)(b)	11	Complies
Frequency Stability (Voltage Variation)	FCC Part 2.1055(d)(1)(2)	12	Complies

2. STANDARDS BASIS

Testing has been carried out in accordance with:

REF.	Code of the standard	Name of the standard
1	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.
2	FCC: CFR 47 Part 2	Code of Federal Regulations (CFR) Title 47, Part 2 – Frequency Allocations and Radio Treaty Matters; General Rules and Regulations: Subpart J – Equipment Authorization Procedures
3	FCC: CFR 47 Part 22	Code of Federal Regulations (CFR) Title 47, Part 22 – Public Mobile Services: Subpart H – Cellular Radiotelephone Service
4	RSS-129	800 MHz Dual-Mode CDMA Cellular Telephones
5	RSS-212	Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional)
6	RSP-100	Radio Equipment Certification Procedure

Note: Unless otherwise stated, (by reference to a version number and a publication date), the latest version of the above documents applies.

Deviations:

Not Applicable.

3. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

3.1 Abbreviations

dB - decibel

dBc - decibels from carrier

dBm - decibels per milliwatt (absolute measurement)

GHz - gigahertz or 1000000000 hertz

kHz - kilohertz or 1000 hertz

MHz - megahertz or 1000000 hertz

3.2 Acronyms

AMPS - Advanced Mobile Phone System

BSS - Base Station Simulator

CDMA - Code Division Multiple Access

EDRP - Effective Dipole Radiated Power

EIRP - Effective Isotropic Radiated Power

EMC - Electromagnetic Compatibility

EMI - Electromagnetic Interference

ERP - Effective Radiated Power

EUT - Equipment under Test

RF - Radio Frequency

3.3 Terms

Base Station Simulator (BSS) - simulates all the necessary signals that a phone would experience while on a live network. There are many types of base station simulators catering for all current protocols, i.e., GSM, AMPS, TDMA, and CDMA.

Cellular - refers to a frequency in the 800MHz band.

4. EQUIPMENT-UNDER-TEST (EUT)

The results in this report relate only to the items listed below:

4.1 Description of Tested Device(s):

Test Performed	Mode of Operation	Date of Receipt	Condition of Sample	Item	Identifying Information
FCC Parts *FCC Part 2.1046(a), 22.913(a), 2.1053*	AMPS, CDMA Cellular	4/15/2005	Operational	Handset	Model: 3152 Type: RM-61 SW: Q100_04w47_11.nbr HWID: 3103 ESN: 044/09426622 Code: 0516956DM11MW
FCC Parts *2.1049(c)(1),* *2.1051,* *2.1055(a)(1)(b),* *2.1055(d)(1)(2)*	AMPS, CDMA Cellular	4/15/2005	Operational	Handset	Model: 3152 Type: RM-61 SW: Q100_04w47_11.nbr HWID: 3103 ESN: 044/09426617 Code: 0516956DM11MW
N/A	N/A	4/15/2005	Operational	Battery	Type: BL-6C Other: 3.7v

4.2 Photograph of Tested Device(s):

Refer to attached EXHIBITS

5. TEST EQUIPMENT LIST

The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report.

Section of Report	NMP#	Test Equipment	Mfr. #	Model #	Calibration Due Date	Calibration Interval
7, 10	00367/ 00368	EMI Receiver	Agilent	8546A / 85460A	8/13/05	1 yr
7, 10	03461	Base Station	R&S	CMU 200	6/29/05	1 yr
7, 10	02680	Spectrum Analyzer	Agilent	E7405A	12/29/05	1 yr
7, 10	02868	Biconilog Antenna	ETS	3142B	8/10/05	1 yr
10	00065	Horn Antenna	EMCO	3115	7/16/05	1 yr
7	02846	Turntable and Tower Controller	Sunol	FM2022 & 2846	NCR	1 yr
8, 9	02665 02664	EMI Receiver	Agilent	8546A / 85460A	2/09/06	1 yr
8, 9, 12	02625	Base Station	R&S	CMU200	6/30/05	1 yr
11,12	00627	DC Power Supply	Hewlett Packard	E3631A	N/A	N/A
11, 12	00837	Temperature Chamber	Tenney Environmental	N/A	20 Jan 06	1 yr
8, 9	N/A	10dB Attenuator	Weinshcel	Model 2	N/A	N/A

6. RF POWER OUTPUT (CONDUCTED)

Specification: FCC Part 2.1046(a), 22.913(a)

6.1 Setup

Testing was performed with the EUT connected to a 6dB splitter and then to the RF Power Meter to measure the conducted RF power output. The base station simulator was connected to the other port of the splitter to establish a call.

6.2 Pass/Fail Criteria

Not Applicable

6.3 Detailed Test Results

Test Technician / Engineer	Julian Kim
Date of Measurement	March 30, 2005
Temperature	21.4 - 21.7 °C
Humidity	34 – 59% RH
Test Result	Was operated at max power and tested in accordance with FCC Parts 2.1046(a), and 22.913(a)

AMPS

Channel	Freq Max (MHz)	ESN 6622 Max (mW)	ESN 6622 Max (dBm)
991	824.04 MHz	316	25.0
384	836.52 MHz	316	25.0
799	848.97 MHz	316	25.0

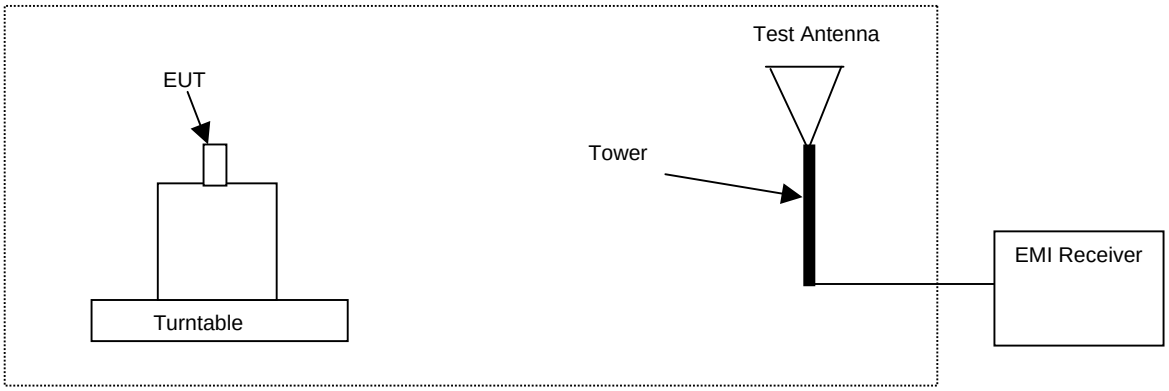
CDMA 800

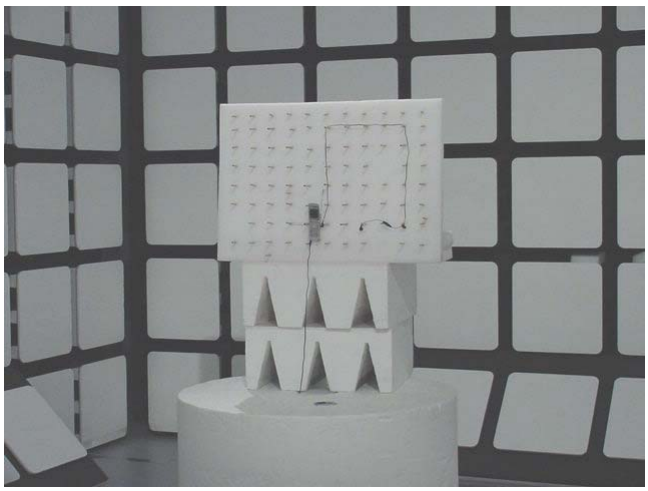
Channel	Freq Max (MHz)	ESN 6622 Max (mW)	ESN 6622 Max (dBm)
1013	824.70 MHz	309	24.9
384	836.52 MHz	316	25.0
777	848.31 MHz	316	25.0

7. RF POWER OUTPUT (RADIATED)

Specification: FCC Part 22.913(a)

7.1 Setup





7.2 Pass/Fail Criteria

Band	FCC Limit (dBm)
Cellular	38.5 (EDRP)

7.3 Detailed Test Results

Test Technician / Engineer	Bob alexander
Date of Measurement	April 16, 2005
Temperature	24 °C
Humidity	47 %RH
Test Result	Complies with FCC Part 22.913(a)

Note: measurements were performed with 1MHz RBW/VBW for AMPS and 3MHz RBW/VBW for CDMA.

AMPS

Channel	Freq Max (MHz)	EDRP EMI (mW)	EDRP EMI (dBm)	Pol.
991	824.04 MHz	288	24.6	V
384	836.52 MHz	209	23.2	V
799	848.97 MHz	316	25.0	V

CDMA 800

Channel	Freq Max (MHz)	EDRP EMI (mW)	EDRP EMI (dBm)	Pol.
1013	824.70 MHz	195	22.9	V
384	836.52 MHz	234	23.7	V
777	848.31 MHz	257	24.1	V

7.4 Measurement Uncertainty

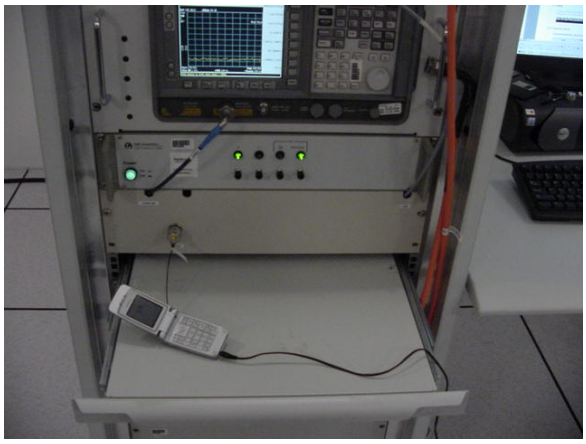
The measurement uncertainty for this test is +/- 2.4dB for 800 to 2000 MHz.

8. OCCUPIED BANDWIDTH (TRANSMITTER CONDUCTED MEASUREMENTS)

Specification: FCC Part 2.1049(c)(1)

8.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call.



8.2 Pass/Fail Criteria

Occupied Bandwidth, Out of Band

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular 800, Low Channel	< 824	-13
Cellular 800, High Channel	> 849	-13

Occupied Bandwidth, In Band

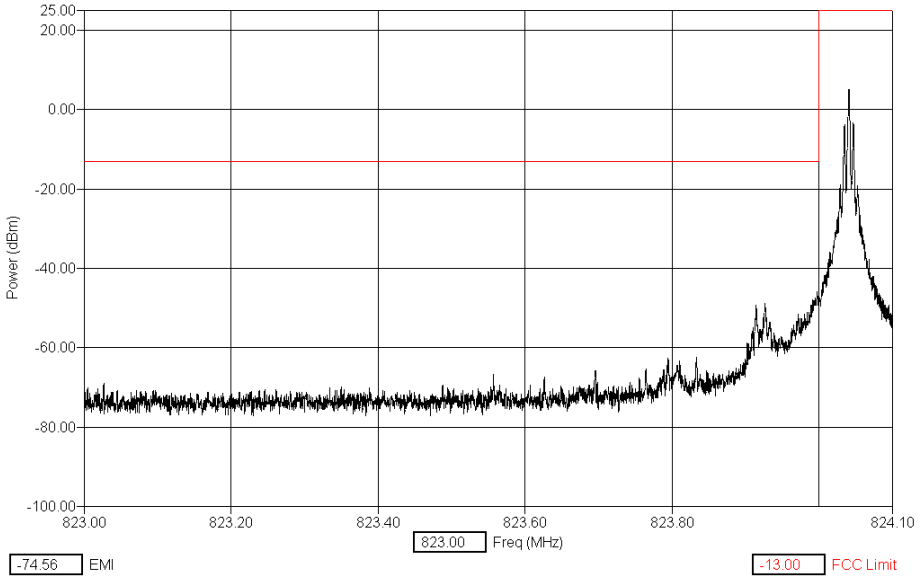
No pass/fail, these plots are used to determine the emission designators.

8.3 Detailed Test Results

Test Technician / Engineer	Darreyl Roberts
Date of Measurement	April 19, 2005
Temperature	24.0°C
Humidity	50.0%RH
Test Result	Complies with FCC Part 2.1049(c)(1)

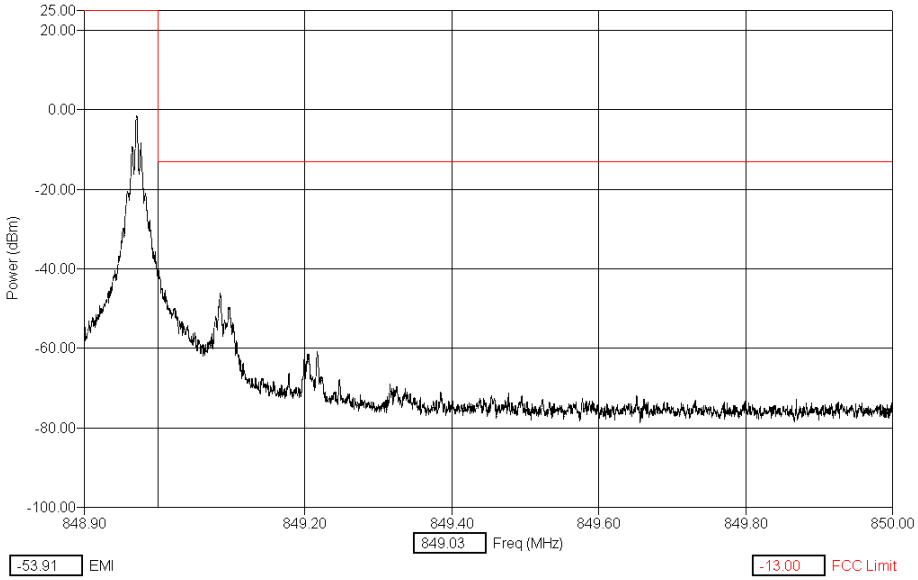
AMPS Channel 991

300Hz RBW, 300Hz VBW, 100ms Sweep Time



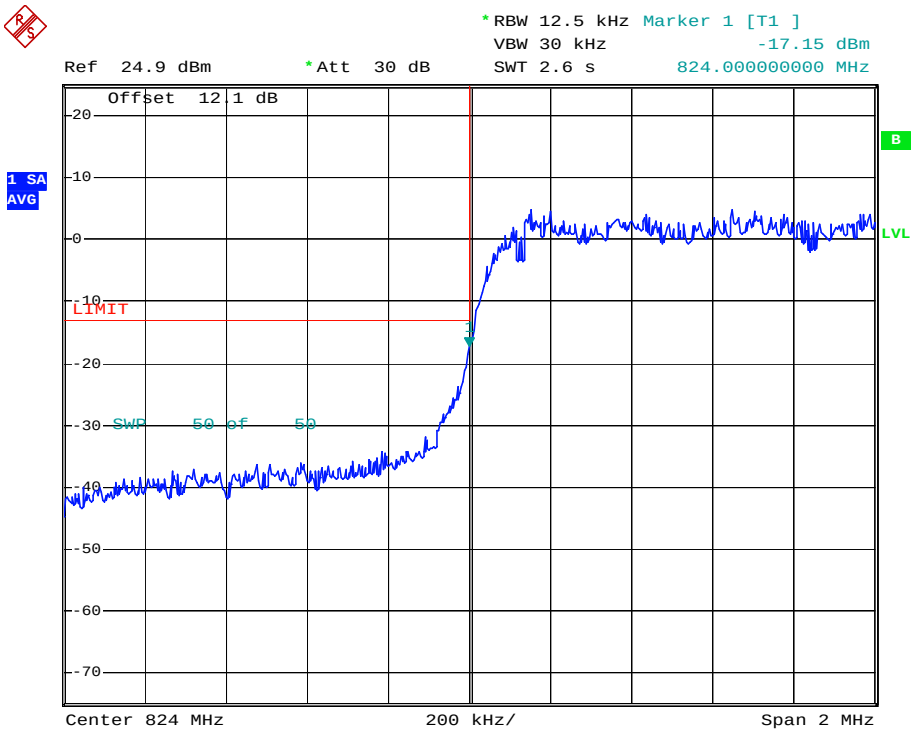
AMPS Channel 799

300Hz RBW, 300Hz VBW, 100ms Sweep Time



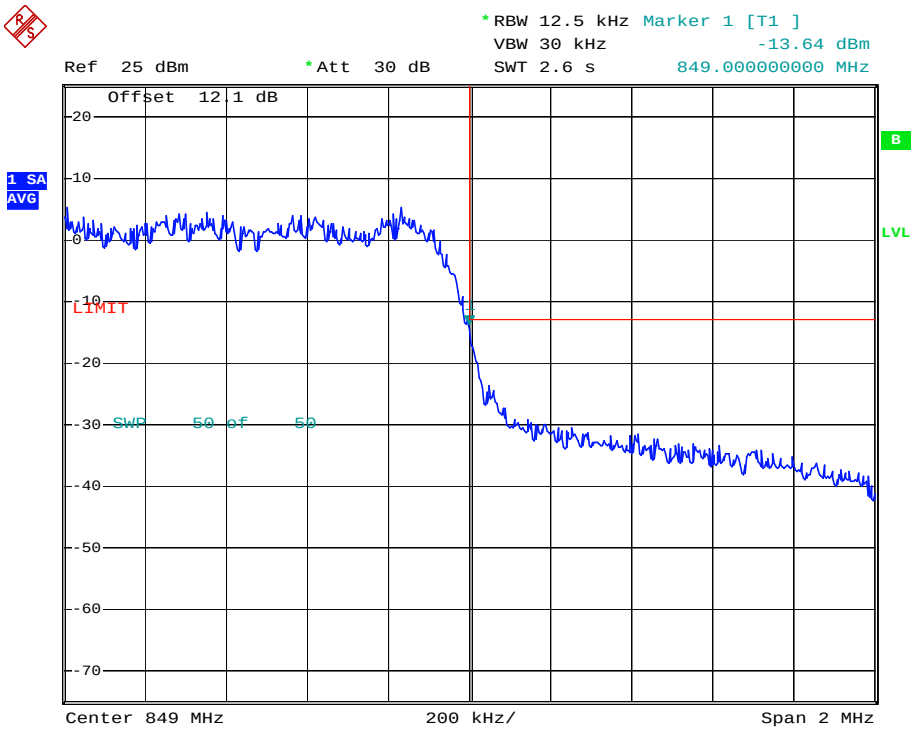
Cellular Band, CDMA 800, Channel 1013

12.5 kHz RBW, 30 kHz VBW, 2.6s Sweep Time



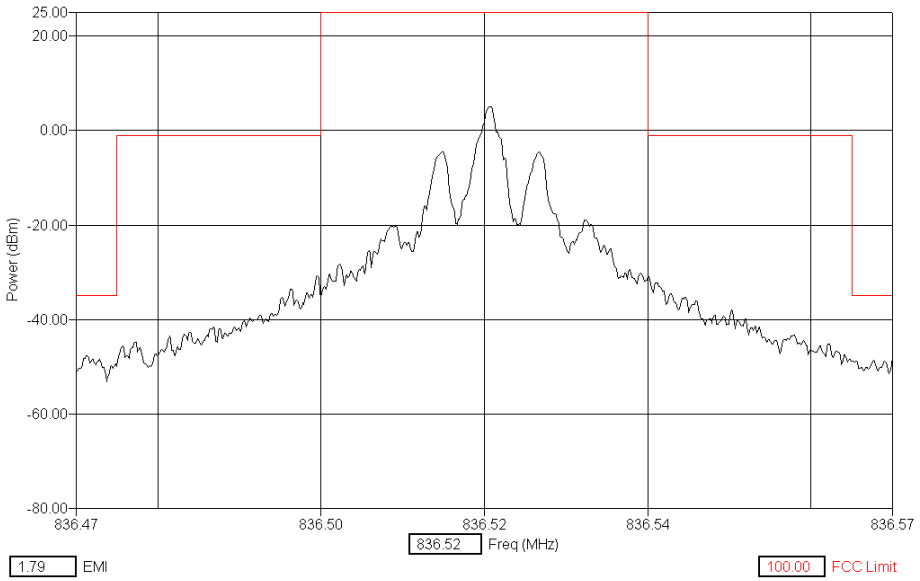
Cellular Band, CDMA, Channel 777

12.5 kHz RBW, 30kHz VBW, 2.6s Sweep Time



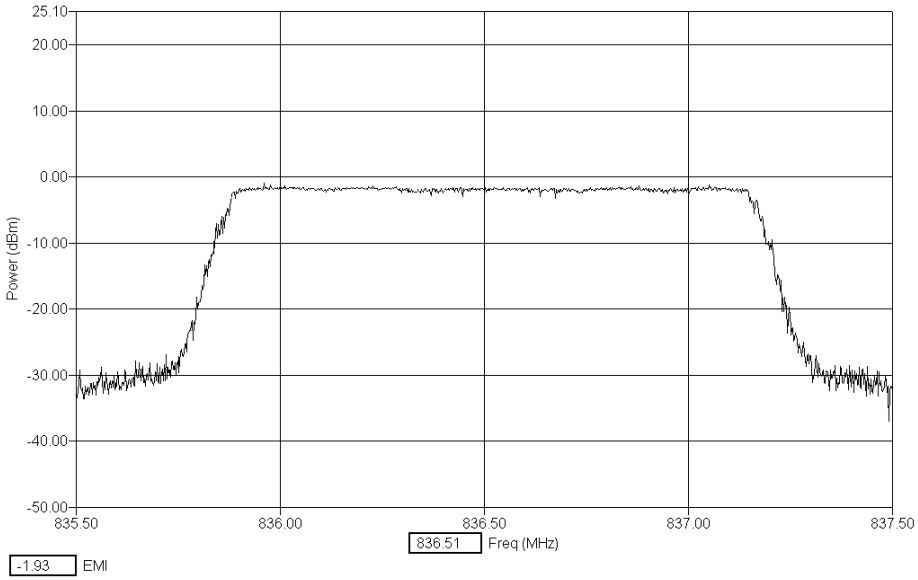
Occupied Bandwidth, In Band; Cellular, AMPS, Channel 384

300Hz RBW, 300Hz VBW, 100ms Sweep Time



Occupied Bandwidth, In Band; Cellular, CDMA 800, Channel 384

30 kHz RBW/VBW, 100ms Sweep Time



8.4 Measurement Uncertainty

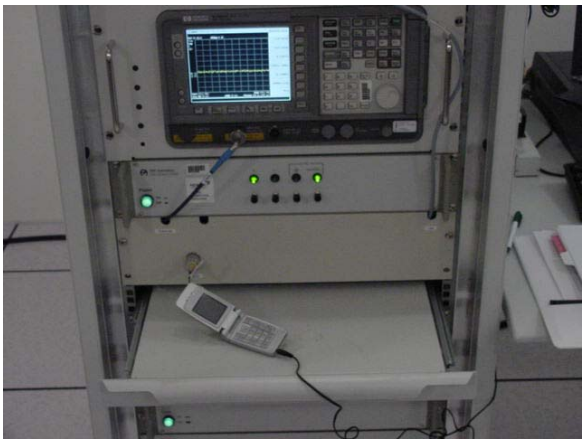
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

9. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Specification: FCC Part 2.1051

9.1 Setup

Testing was performed with the EUT connected to a 6dB attenuator, 6dB splitter, filter bank and then to the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call. Filters were introduced to reduce or eliminate spurious emission, which could be generated internally in the EMI receiver.



9.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limits (dBm)
Cellular / PCS	30 – 20000 *	-13

* Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

9.3 Detailed Test Results

Test Technician / Engineer	Darreyl Roberts
Date of Measurement	April 15, 2005
Temperature	24.0°C
Humidity	41.0%RH
Test Result	Complies with FCC Part 2.1051

Note 1: EMI (dBm) = trace (dBuV) + cable loss (dB) + filter loss (dB).

Note 2: measurements were performed with 3MHz RBW/VBW.

AMPS Low Ch991

Freq Max (MHz)	(Pk) EMI (dBm)	FCC Limit **(dBm)**
1648.08	-34.2	-13
2472.12	-45.2	-13
3296.16	-47.8	-13
4120.20	-52.2	-13
4944.24	-54.7	-13
5768.28	-52.8	-13
6592.32	-52.3	-13
7416.36	-53.1	-13
8240.40	-53.9	-13

AMPS Mid Ch384

Freq Max (MHz)	(Pk) EMI (dBm)	FCC Limit **(dBm)**
1673.04	-30.3	-13
2509.56	-43.5	-13
3346.08	-46.8	-13
4182.60	-51.3	-13
5019.12	-51.9	-13
5855.64	-53.8	-13
6692.16	-52.3	-13
7528.68	-54.2	-13
8365.20	-53.0	-13

AMPS High Ch799

Freq Max (MHz)	(Pk) EMI (dBm)	FCC Limit **(dBm)**
1697.94	-33.1	-13
2546.91	-42.1	-13
3395.88	-43.6	-13
4244.85	-53.2	-13
5093.82	-52.9	-13
5942.79	-54.1	-13
6791.76	-52.9	-13
7640.73	-53.2	-13
8489.70	-54.0	-13

CDMA 800 Low Ch1013

Freq Max (MHz)	(Pk) EMI (dBm)	FCC Limit **(dBm)**
1649.4	-31.4	-13
2474.1	-47.0	-13
3298.8	-50.5	-13
4123.5	-53.6	-13
4948.2	-55.1	-13
5772.9	-54.7	-13
6597.6	-54.1	-13
7422.3	-52.6	-13
8247.0	-53.7	-13

CDMA 800 Mid Ch384

Freq Max (MHz)	(Pk) EMI (dBm)	FCC Limit **(dBm)**
1673.04	-28.8	-13
2509.56	-44.3	-13
3346.08	-48.3	-13
4182.60	-53.3	-13
5019.12	-54.0	-13
5855.64	-54.1	-13
6692.16	-53.6	-13
7528.68	-52.8	-13
8365.20	-54.2	-13

CDMA 800 High Ch777

Freq Max (MHz)	(Pk) EMI (dBm)	FCC Limit **(dBm)**
1696.62	-30.6	-13
2544.93	-42.5	-13
3393.24	-45.5	-13
4241.55	-52.6	-13
5089.86	-55.2	-13
5938.17	-55.6	-13
6786.48	-54.2	-13
7634.79	-53.6	-13
8483.1	-53.9	-13

9.4 Measurement Uncertainty

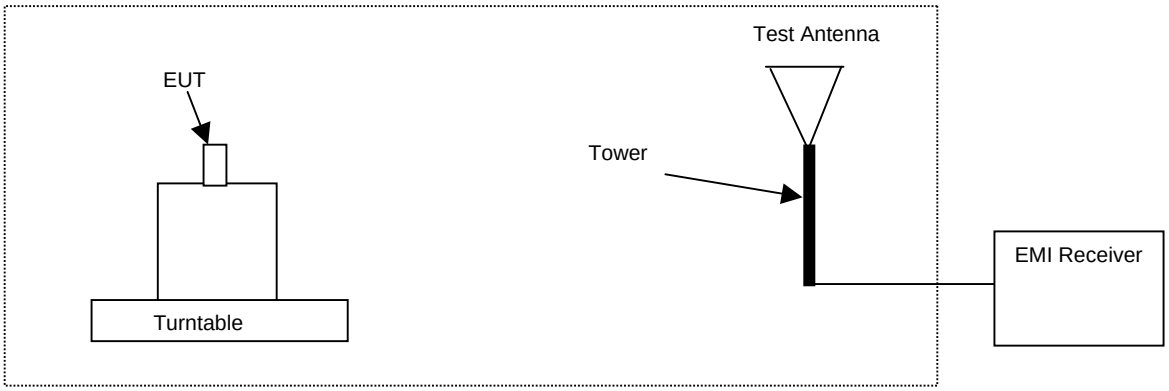
The measurement uncertainty for this test is +/- 3.7dB for 100kHz - 1000MHz and +/- 5.3dB for 1 - 20GHz.

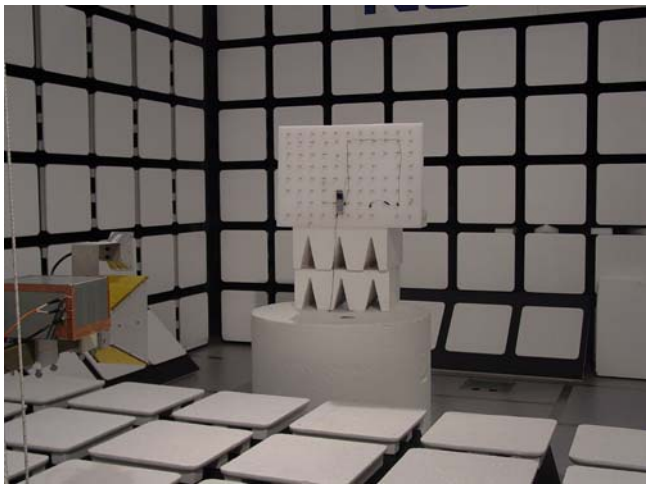
10. FIELD STRENGTH OF SPURIOUS RADIATION

Specification: FCC Part 2.1053

10.1 Setup

Test equipment set-up.





10.2 Pass/Fail Criteria

Band	Frequency Range (MHz)	FCC Limit (dBm)
Cellular / PCS	30 – 20000*	-13

- Frequency to be investigated up to the 10th harmonic of the highest clock or frequency used.

Substitution method according to ANSI/TIA/EIA 603-1 was used for final measurements.

10.3 Detailed Test Results

Test Technician / Engineer	Bob Alexander	
Date of Measurement	April 16 - 18, 2005	
Temperature / Humidity	23-24°C	45-47%RH
Test Result	Complies with FCC Part 2.1053	

Note: Measurements were performed with 1MHz RBW/VBW.

AMPS, Channel

		EDRP=	23.2	dBm
Freq	(PEAK) EMI			
(MHz)	(dBm)	dBc	FCC limit	Pol
1673.04	-34.64	-57.8	-13	V
1673.04	-36.1	-59.3	-13	H
2509.56	-30.56	-53.8	-13	V
2509.56	-29.31	-52.5	-13	H
3346.08	-43.8	-67.0	-13	V
3346.08	-41.76	-65.0	-13	H
4182.6	-46.33	-69.5	-13	V
4182.6	-46.7	-69.9	-13	H
5019.12	-56.5	-79.7	-13	V
5019.12	-57.42	-80.6	-13	H
5855.64	-56.51	-79.7	-13	V
5855.64	-53.28	-76.5	-13	H
6692.16	-54.14	-77.3	-13	V
6692.16	-54.21	-77.4	-13	H
7528.68	-54.52	-77.7	-13	V
7528.68	-51.81	-75.0	-13	H
8365.2	-54.2	-77.4	-13	V
8365.2	-47.79	-71.0	-13	H

CDMA Cellular, Channel 384

EDRP for Channel 384: 23.7 dBm

Freq Max (MHz)	(PK) EMI (dBm)	dBc	FCC Limit (dBm)	Pol.
1673.0	-47.48	-71.2	-13.0	H
1673.0	-48.62	-72.3	-13.0	V
2509.6	-42.84	-66.5	-13.0	H
2509.6	-42.76	-66.5	-13.0	V
3346.1	-56.77	-80.5	-13.0	H
3346.1	-55.78	-79.5	-13.0	V
4182.6	-59.21	-82.9	-13.0	H
4182.6	-59.77	-83.5	-13.0	V
5019.1	-68.67	-92.4	-13.0	H
5019.1	-68.86	-92.6	-13.0	V
5855.6	-67.16	-90.9	-13.0	H
5855.6	-66.03	-89.7	-13.0	V
6692.2	-65.85	-89.6	-13.0	H
6692.2	-65.67	-89.4	-13.0	V
7528.7	-65.88	-89.6	-13.0	H
7528.7	-64.95	-88.7	-13.0	V
8365.2	-64.77	-88.5	-13.0	H
8365.2	-62.53	-86.2	-13.0	V

10.4 Measurement Uncertainty

The measurement uncertainty for this test is +/- 5.2dB for 30-300MHz; +/- 5.2dB for 300-1000MHz, +/- 5.6dB for 1-6GHz and +/-6.8 for 6-18GHz.

11. FREQUENCY STABILITY (TEMPERATURE VARIATION)

Specification: FCC Part 2.1055(a)(1)(b)

11.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

11.2 Pass/Fail Criteria

Not Applicable

11.3 Detailed Test Results

Test Technician / Engineer	Darreyl Roberts	
Date of Measurement	April 19, 2005	
Temperature / Humidity	26 °C	44 %RH
Test Result	Tested in accordance with 2.1055(a)(1)(b), 24.235 at maximum power setting.	

Temp. (°C)	AMPS, Channel 384	CDMA 800, Channel 384
	Change (Hz)	Change (Hz)
-30	205Hz	13Hz
-20	228 Hz	15 Hz
-10	247 Hz	18 Hz
0	226 Hz	21 Hz
10	245 Hz	17 Hz
20	234 Hz	22 Hz
30	218 Hz	22 Hz
40	211 Hz	24 Hz
50	219 Hz	22 Hz

12. FREQUENCY STABILITY (VOLTAGE VARIATION)

Specification: FCC Part 2.1055(d)(1)(2)

12.1 Setup

The EUT was connected to the base station simulator to measure the RF power output.

12.2 Pass/Fail Criteria

Not Applicable

12.3 Detailed Test Results

Test Technician / Engineer	Darreyl Roberts	
Date of Measurement	April 19, 2005	
Temperature / Humidity	26 °C	44 %RH
Test Result	Tested in accordance with 2.1055(d)(1)(2) at maximum power setting.	

AMPS, Call Mode, Channel 384

% of STV	Voltage	Change (Hz)
85	3.14Vdc	N/A
100 (Nominal)	3.7Vdc	-234Hz
115	4.3Vdc	-263Hz
Battery End Point	3.2Vdc	-232Hz

CDMA 800, Call Mode, Channel 384

% of STV	Voltage	Change (Hz)
85	3.14Vdc	N/A
100 (Nominal)	3.7Vdc	15Hz
115	4.3Vdc	17Hz
Battery End Point	3.2Vdc	17Hz