CFR 47 Part 2, 22, and 24 Test Report

Test Report Number: WR-896.003

Terminal device: FCC ID: GMLRM-88 Model: E62-1 Type: RM-88 Build: 4.0 SW: 5.4002
(Detailed information is listed in section 4).

Originator:	Cindy Trinh
Function:	TCC - Dallas – EMC
Version/Status:	1.0 Approved
Location:	TCC Directories
Date:	December 14, 2005

Change History:

Version	*Date*	*Status*	*Handled By*	*Comments*
0.1	9-Dec-05	Draft	Cindy Trinh	
0.2	9-Dec-05	Proposal	Cindy Trinh	
0.3	13-Dec-05	Reviewed	Severson Mark	
1.0	14-Dec-05	Approved	Severson Mark	

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
6021 Connection Drive
Irving, Texas 75039
U.S.A.
Tel. 972-894-5000

Date and signatures: **December 14, 2005**

For the contents:

Cindy Trinh
Digitally signed by Cindy Trinh
DN: cn=Cindy Trinh, c=US, o=Nokia, ou=TCC Dallas
Date: 2005.12.21 09:30:44 -06'00'

Cindy Trinh
Test Engineer

Severson Mark
Technical Review

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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 661N.

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
6021 Connection Drive
Irving, Texas 75039
U.S.A.

Manufacturer: Nokia Inc
6021 Connection Drive
Irving, Texas 75039
U.S.A.

1.2.2 Sub-part 2.1033(c)(2)

FCC ID: GMLRM-88

Model No: E62-1

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: 30K0GXW, 300KGXW, 300KG7W

1.2.5 Sub-part 2.1033(c)(5)

Frequency Range, MHz: GSM 850 824.2-848.8MHz

EGSM 900 880.2-914.8MHz

GSM 1800 1710.2-1784.8MHz

GSM 1900 1850.2-1909.8MHz

1.2.6 Sub-part 2.1033(c)(6)

Power Rating, Watts: GSM 850 1.175W

GSM 1900 1.175W

EGPRS 850 0.437W

EGPRS 1900 0.525W

☐ 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: 1.175W

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 = 0.318
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), 2.1046,2.1053, Part 22, and Part 24.

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 (Radiated)	FCC Part 22.913(a), 24.232(b)(c)	6	Complies
Band edge compliance	FCC Part 22.917(a), 24.238(a)	7	Complies
Field Strength of Spurious Radiation	FCC Part 2.1053	8	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	FCC: CFR 47 Part 24	Code of Federal Regulations (CFR) Title 47, Part 24 – Personal Communications Services: Subpart E – Broadband PCS
5	RSS-128	800 MHz Dual-Mode TDMA Cellular Telephones
6	RSS-129	800 MHz Dual-Mode CDMA Cellular Telephones
7	RSS-132	800 MHz Cellular Telephones Employing New Technologies
8	RSS-133	2 GHz Personal Communications Services, Industry Canada
9	RSS-212	Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional)
10	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

GSM - Global System for Mobile communications

PCS - Personal Communications Services

RF - Radio Frequency

TDMA - Time Division Multiple Access

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.

PCS - refers to a frequency in the 1900MHz 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 Part 2.1053	GSM/EDGE 850/1900	8-Dec-05	Functional	Phone	FCC ID: GMLRM-88 Type: RM-88 Model: E62-1 Build: 4.0 SW: 5.4002 ESN: 011004001923938
FCC Part 22.913(a), 22.917(a), 24.232(b)(c),	GSM/EDGE 850/1900	8-Dec-05	Functional	Phone	FCC ID: GMLRM-88 Type: RM-88 Model: E62-1 Build: 4.0 SW: 5.4002 ESN: 011004001923979
N/A	GSM/EDGE 850/1900	8-Dec-05	N/A	Mini SD Card	Type: S128T PN: 0530Y23456N
N/A	GSM/EDGE 850/1900	8-Dec-05	N/A	Battery	Type: BP-5L Other: 3.7 Vdc
N/A	GSM/EDGE 850/1900	8-Dec-05	N/A	Headset	Type: HS-40 HW: 2.0 SN: 94
N/A	GSM/EDGE 850/1900	8-Dec-05	N/A	Charger	Type: AC-4U

4.2 Photograph of Tested Device(s):

Refer to attached EXHIBITS

5. TEST EQUIPMENT LIST

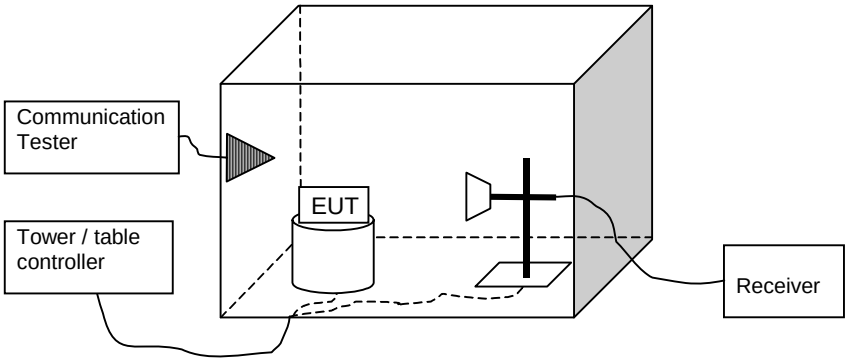
The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas 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
6,7,8	04073	EMI Receiver	R&S	ESIB 26	03-Aug-06	12 months
6,7,8	02625	Base Station	R&S	CMU-200	30-Aug-06	12 months
6,7,8	02871	Biconilog Antenna	EMC Automation	3003C	08-July-06	12 months
6,7,8	04076	Horn Antenna	ETS	3117	18-Aug-06	12 months
6,7,8	02836	Turntable and Tower Controller	Sunol	FM2022 & 2846	N/A	NCR

6. RF POWER OUTPUT (RADIATED)

Specification: FCC Part 22.913(a), 24.232(b)(c)

6.1 Setup



6.2 Test method

The measurement is made according to TIA-603-B-2002 as follows:

The measurement is performed in the Anechoic Chamber with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system. The turntable is rotated 360 degrees and this is repeated for both horizontal and vertical receive antenna polarizations.

The EUT is placed on a nonconductive plate at 170 cm height.

The substitution method is used. Substitution values at each frequencies are measured beforehand and saved to the test software.

The substitution corrections are obtained as described below:

$$A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain. P_{SUBST_TX} is signal generator level, P_{SUBST_RX} is receiver level, L_{SUBST_CABLES} is cable losses including both TX and RX cables and $G_{SUBST\_TX\_ANT}$ is substitution antenna gain.

The measurement results are obtained as described below:

$$P\ [dBm] = P_{MEAS} + A_{TOT}$$

Where P_{MEAS} is receiver reading in dBm and A_{TOT} is total correction factor including cable loss and substitution correction ($A_{TOT} = L_{CABLES} + A_{SUBST}$).

Pass/Fail Criteria

Band	FCC Limit (dBm)
Cellular	38.5 (EDRP)
PCS	33.0 (EIRP)

6.3 Detailed Test Results

Test Technician / Engineer	Cindy Trinh
Date of Measurement	6-Dec-05
Temperature	24 °C
Humidity	16 to 25 %RH
Test Result	Complies with FCC Part 22.913(a) and 24.232 (b)(c)

Note: measurements were performed with RBW=1 MHz and VBW=3 MHz

GSM 850

Channel	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128	30.70	1.175	-6.00	36.70	HORIZONTAL	PASSED
190	29.40	0.871	-6.40	35.80	HORIZONTAL	PASSED
251	29.70	0.933	-6.20	35.90	HORIZONTAL	PASSED

EDGE 850

Channel	ERP [dBm]	ERP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
128	26.40	0.437	-10.30	36.70	HORIZONTAL	PASSED
190	26.40	0.437	-10.50	36.90	VERTICAL	PASSED
251	23.50	0.224	-12.40	35.90	HORIZONTAL	PASSED

GSM 1900

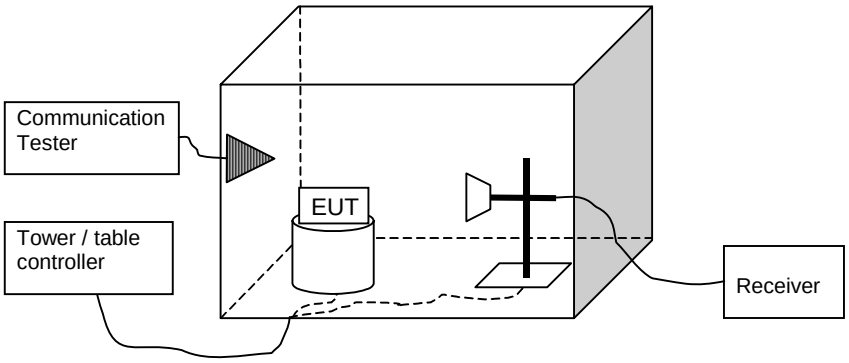
Channel	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512	27.00	0.501	-20.70	47.70	VERTICAL	PASSED
661	29.30	0.851	-18.80	48.10	VERTICAL	PASSED
810	30.70	1.175	-15.20	45.90	VERTICAL	PASSED

EDGE 1900

Channel	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Result
512	27.20	0.525	-20.50	47.70	VERTICAL	PASSED
661	25.80	0.380	-22.30	48.10	VERTICAL	PASSED
810	25.70	0.372	-20.20	45.90	VERTICAL	PASSED

6.4 Band edge Compliance

(FCC §22.917(a), 24.238(a), RSS-132 4.5, RSS-133 6.3)Test setup



6.5 Test method and limit

The measurement is made according to FCC rules part 22 and 24 and IC standards RSS-GEN, RSS-132 and RSS-133.

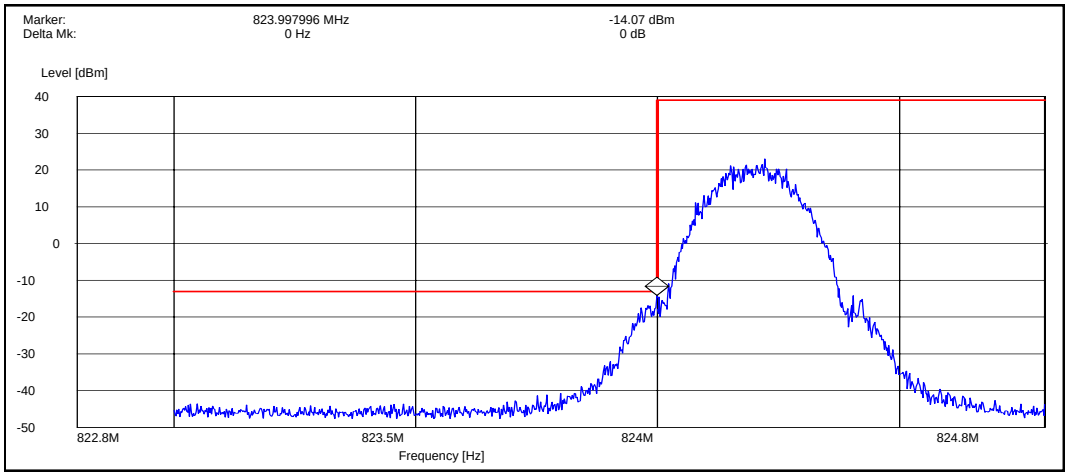
Limits for band edge compliance measurements

Operation band	Frequency range [MHz]	Limit [dBm]
GSM 850 / WCDMA 850	Below 824 and above 849	-13
GSM 1900 / WCDMA 1900	Below 1850 and above 1910	-13

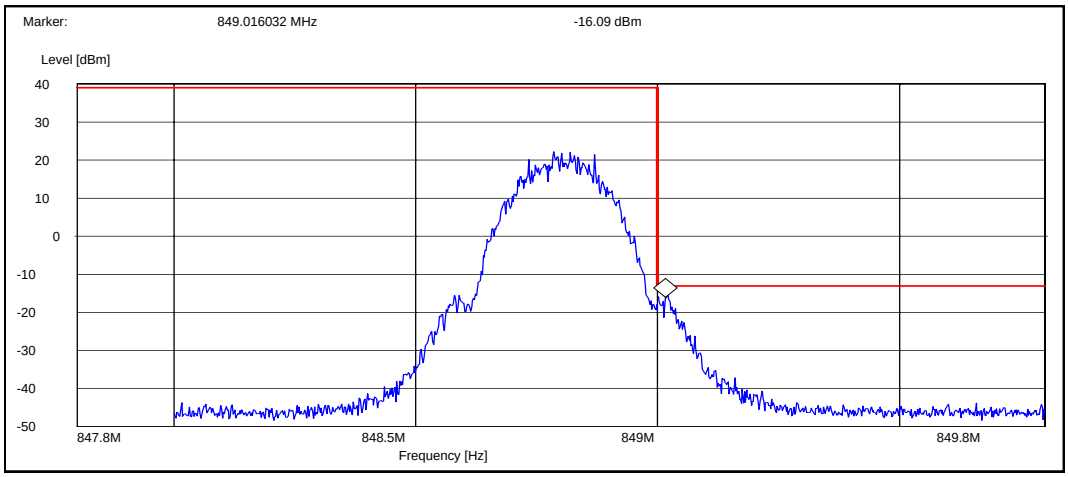
6.6 GSM 850 Test results

Operation mode (TX on)	Channel	Level [dBm]
GSM	128	-14.07
GSM	251	-16.09
EGPRS	128	-21.72
EGPRS	251	-25.0

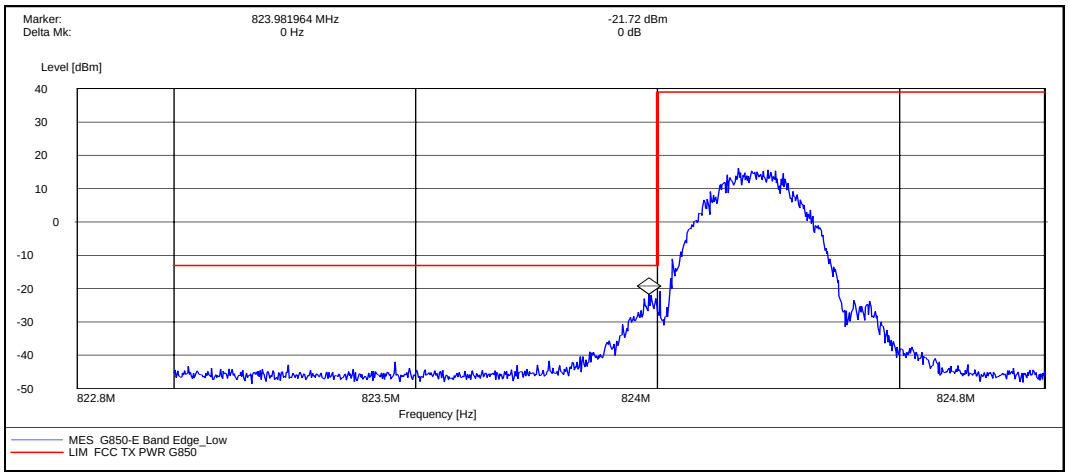
GSM 850, channel 128 (Peak detector, RBW: 3 kHz)



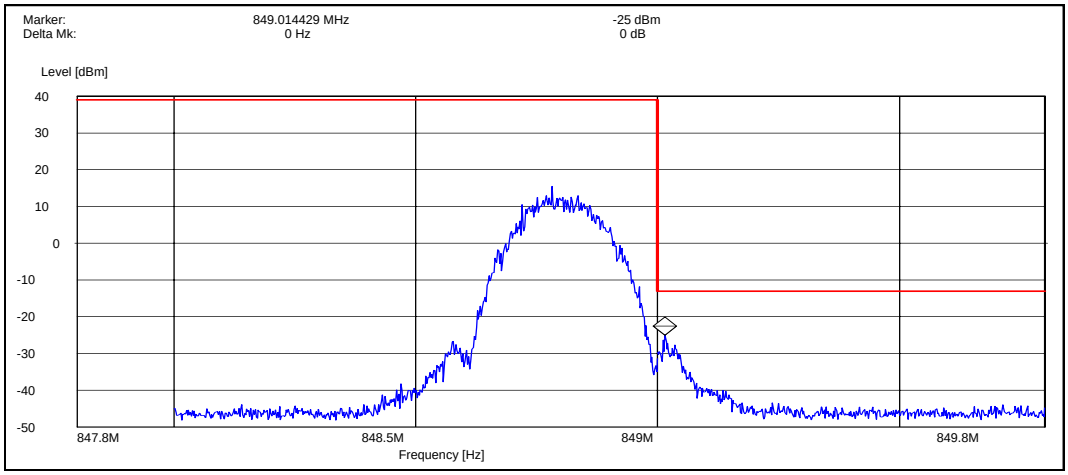
GSM 850, channel 251 (Peak detector, RBW: 3 kHz)



EGPRS mode, channel 128 (Peak detector, RBW: 3 kHz)



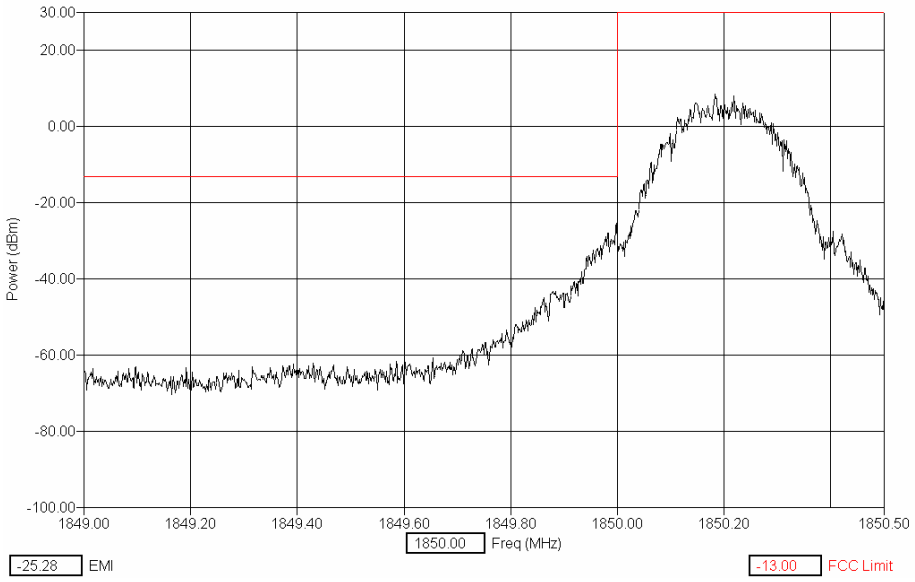
EGPRS mode, channel 251 (Peak detector, RBW: 3 kHz)



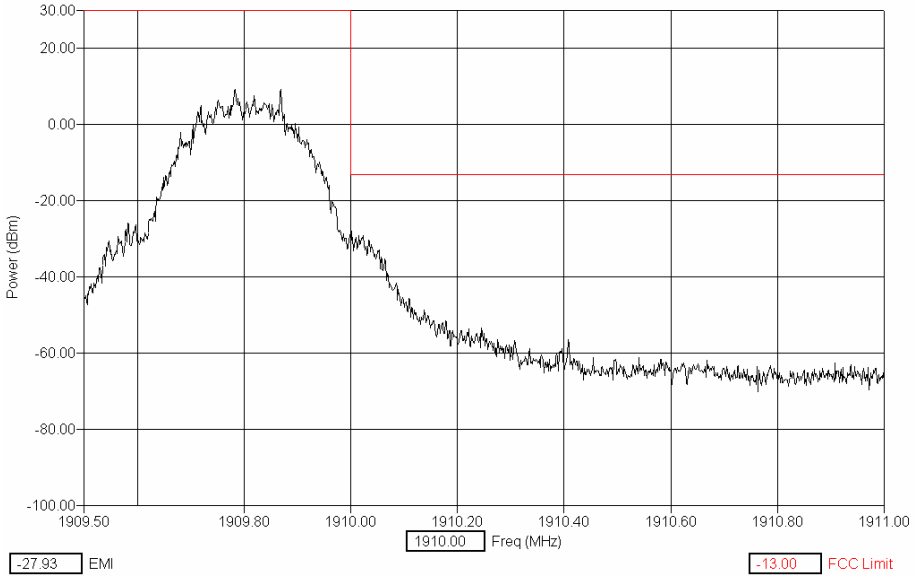
6.7 GSM 1900 Test results

Operation mode (TX on)	Channel	Level [dBm]
GSM	512	-25.28
GSM	810	-27.93
EGPRS	512	-33.16
EGPRS	810	-33.53

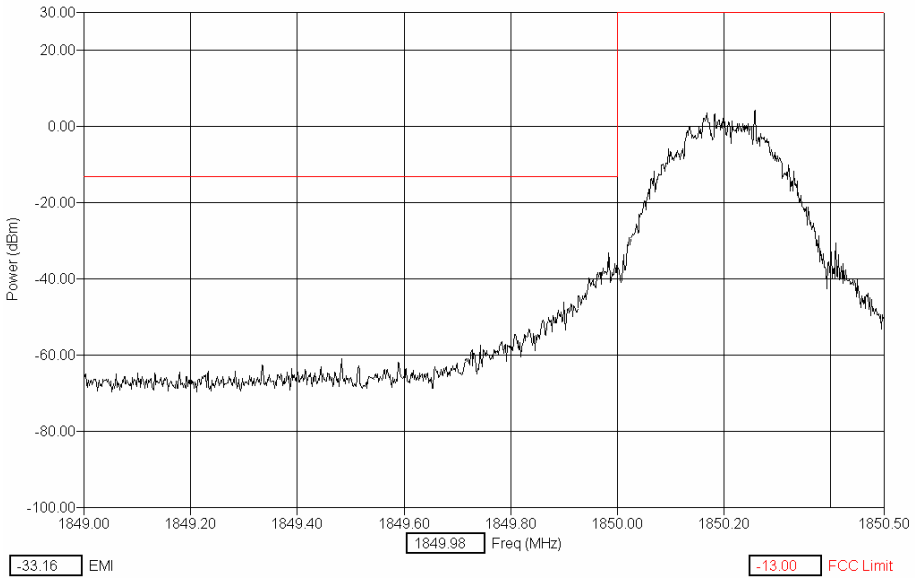
GSM 1900, Low channel 512 (Peak detector, RBW: 3 kHz):



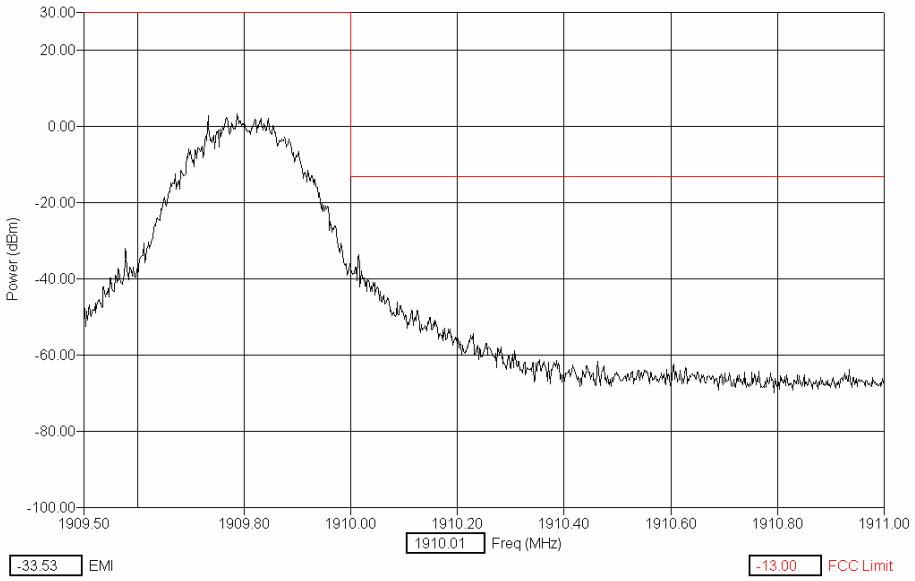
GSM 1900, High channel 810 (Peak detector, RBW: 3 kHz):



EGPRS 1900, Low channel 512 (Peak detector, RBW: 3 kHz):



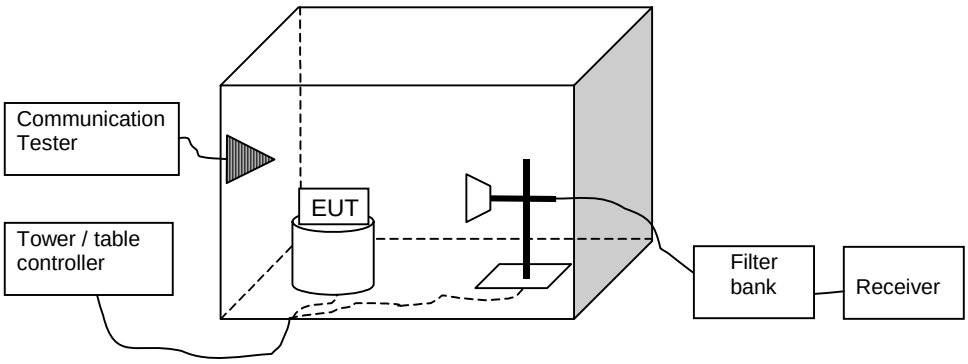
EGPRS 1900, Low channel 810 (Peak detector, RBW: 3 kHz):



7. FIELD STRENGTH OF SPURIOUS RADIATION

Specification: FCC Part 2.1053

7.1 Setup



The measurement is made according to TIA-603-B-2002 as follows:

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

The substitution method is used. Substitution values at each frequencies are measured beforehand and saved to the test software.

The substitution corrections are obtained as described below:

$$A_{SUBST} = P_{SUBST\_TX} - P_{SUBST\_RX} - L_{SUBST\_CABLES} + G_{SUBST\_TX\_ANT}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain. P_{SUBST_TX} is signal generator level, P_{SUBST_RX} is receiver level, L_{SUBST_CABLES} is cable losses including both TX and RX cables and $G_{SUBST\_TX\_ANT}$ is substitution antenna gain.

The measurement results are obtained as described below:

$$P\ [dBm] = P_{MEAS} + A_{TOT}$$

Where P_{MEAS} is receiver reading in dBm and A_{TOT} is total correction factor including cable loss, preamplifier gain and substitution correction ($A_{TOT} = L_{CABLES} - G_{PREAMP} + A_{SUBST}$).

7.2 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.

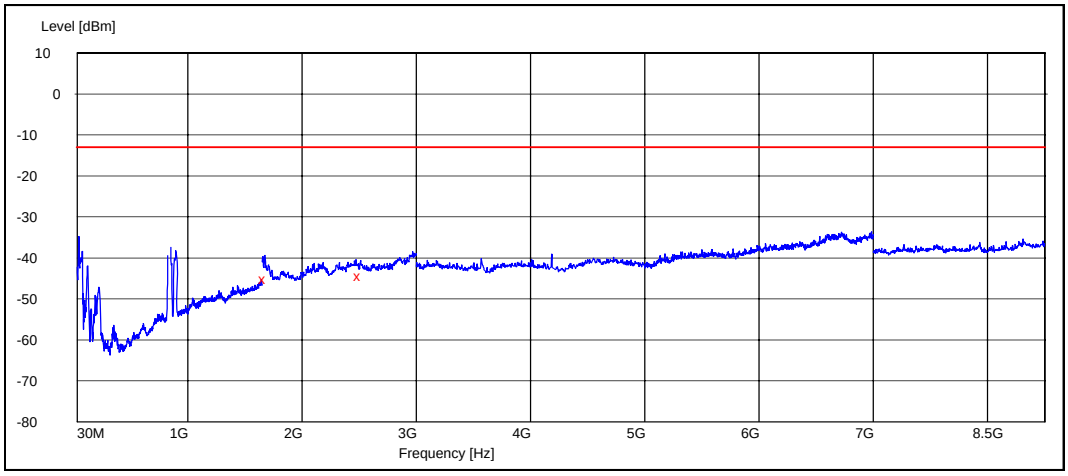
Substitution method according to ANSI/TIA/EIA 603-1 was used for final measurements.

7.3 Detailed Test Results

Test Technician / Engineer	Cindy Trinh
Date of Measurement	9-Dec-05
Temperature	24 °C
Humidity	21 to 25 %RH
Test Result	Complies with FCC Part 2.1053

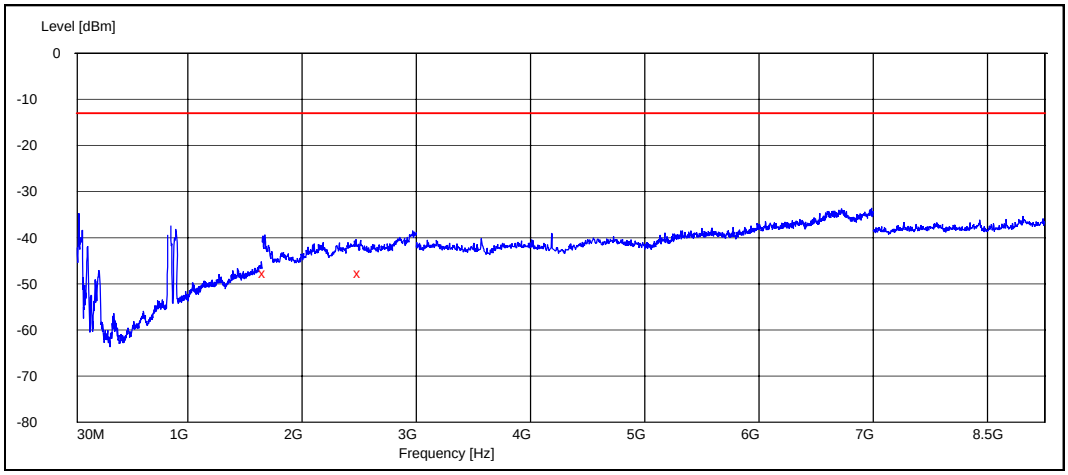
Note: 30MHz to 1GHz were performed with 1MHz RBW/VBW; 1GHz to 3GHz were performed with 1MHz RBW/VBW; 3GHz to 6GHz were performed with 3MHz RBW/VBW; 6GHz to 18GHz were performed with 1MHz RBW/VBW.

GSM 850



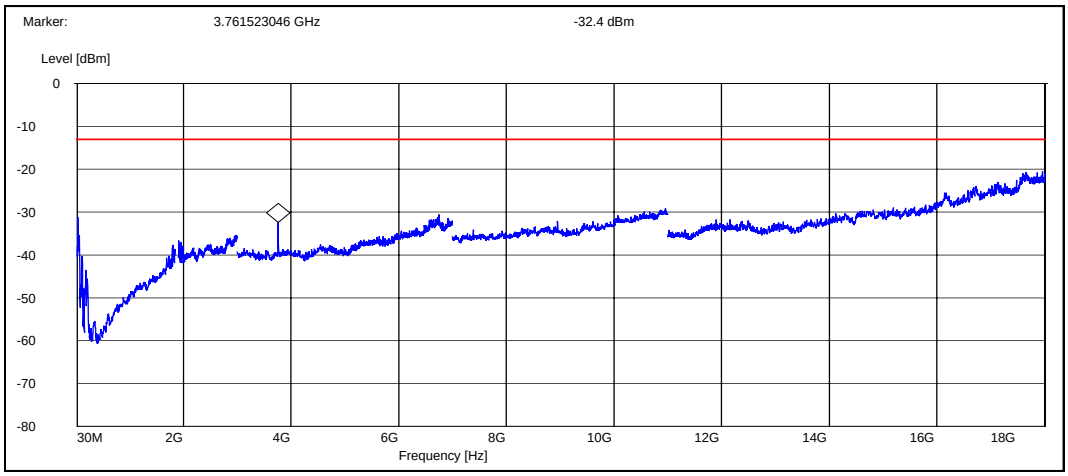
Frequency [MHz]	Level [dBm]	Margin [dB]	Azimuth [deg]	Polarisation	Elevation [deg]	Result
1673.348697	-45.10	32.10	152.00	VERTICAL	68.00	PASSED
2509.820641	-44.50	31.50	67.00	HORIZONTAL	12.00	PASSED

EDGE 850



Frequency [MHz]	Level [dBm]	Margin [dB]	Azimuth [deg]	Polarisation	Elevation [deg]	Result
1672.848697	-47.70	34.70	157.00	VERTICAL	74.00	PASSED
2509.820641	-47.70	34.70	112.00	HORIZONTAL	0.00	PASSED

GSM 1900



EDGE 1900